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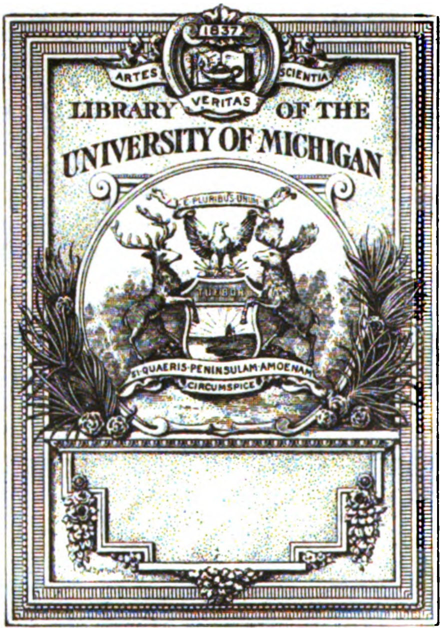
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The University of Minnesota Bulletin

General Catalogue

1908-1909

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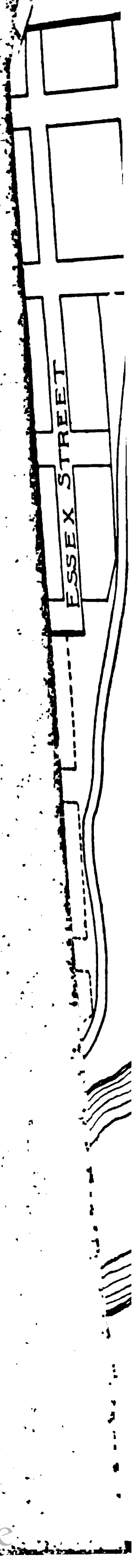
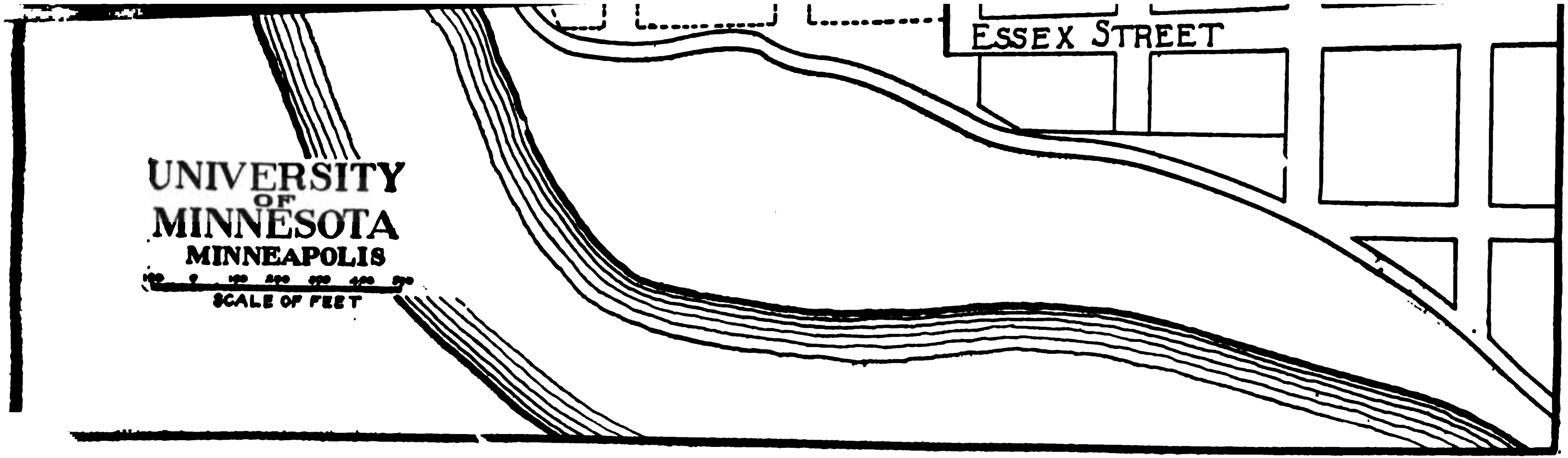
Minneapolis Minnesota.

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THE UNIVERSITY OF MINNESOTA

CATALOGUE

FOR THE YEAR

1908-1909

AND

ANNOUNCEMENTS

FOR THE YEAR

1909-1910

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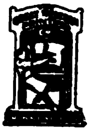
MINNEAPOLIS
1909



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I.

GENERAL UNIVERSITY INFORMATION

CALENDAR FOR 1909-1910

1909

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University Calendar, 1909-1910

THE UNIVERSITY YEAR

The University year covers a period of thirty-eight weeks beginning on the second Tuesday in September. Commencement day is always the second Thursday in June.

1909			
Sept.	7	Tuesday	Registration begins
Sept.	7-12	Week	Entrance examinations, condition examinations, registration
Sept.	14	Tuesday	First semester begins
Sept.	20	Monday	University Council meeting
Oct.	4	Monday	School of Agriculture session begins
Oct.	7	Thursday	Board of Regents meeting
Nov.	10	Wednesday	First quarter ends
Nov.	11	Thursday	Second quarter begins
Nov.	22	Monday	University Council meeting
Nov.	25	Thursday	Thanksgiving Day, recess three days
Dec.	14	Tuesday	Board of Regents meeting
Dec.	18	Friday	Holiday recess begins 5:40 P. M.
1910			
Jan.	4	Tuesday	Holiday recess ends 8:30 A. M.
Jan.	27	Thursday	First semester ends
Jan.	28	Friday	Registration for second semester begins
Jan.	31	Monday	Registration for second semester closes
Feb.	1	Tuesday	Second semester begins
Feb.	12	Saturday	Lincoln's birthday, holiday
Feb.	22	Tuesday	Washington's birthday, holiday
March	19	Saturday	Easter recess begins 5:40 P. M.
March	28	Monday	Easter recess ends 8:30 A.M.
April	1	Monday	University Council meeting
April	6	Wednesday	Third quarter ends
April	7	Thursday	Fourth quarter begins
May	5	Thursday	Board of Regents meeting
May	23	Monday	University Council meeting
May	30	Monday	Decoration Day, holiday
June	4	Saturday	Second semester ends. Semester examinations close
June	5	Sunday	Baccalaureate service
June	6	Monday	Senior class exercises
June	7	Tuesday	Phi Beta Kappa address 8:00 P. M.
June	7	Tuesday	Senior Promenade 9:00 P. M.
June	8	Wednesday	Alumni Day
June	8	Wednesday	Board of Regents meeting
June	9	Thursday	Thirty-eighth annual commencement
June	10	Friday	Summer vacation begins

PROGRAM—ENTRANCE EXAMINATIONS
1909–10

Sept.	7	Tuesday	9 A. M.	Astronomy
				Botany
				Geology
				Chemistry
				Physiography
				Zoology
			2 P. M.	American Government
				History
				Political Economy
				Physics
Sept.	8	Wednesday	9 A. M.	English
			2 P. M.	German
				French
				Latin
				Scandinavian
Sept.	9	Thursday	9 A. M.	Elementary Algebra
				Commercial Geography
			2. P M.	Higher Algebra
Sept.	10	Friday	9 A. M	Plane Geometry
			2 P. M.	Solid Geometry

All candidates for examinations should report at the scheduled time in Room 13 Library Building.

The School Year for 1910–11 will begin Tuesday, September 13.

The University

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges and departments:

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

THE DEPARTMENT OF AGRICULTURE, including—

- THE COLLEGE OF AGRICULTURE
- THE SCHOOL OF AGRICULTURE
- SHORT COURSE FOR FARMERS
- THE DAIRY SCHOOL
- THE CROOKSTON SCHOOL OF AGRICULTURE

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY, including

- THE UNIVERSITY TRAINING SCHOOL FOR NURSES

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

- THE MAIN STATION AT ST. ANTHONY PARK
- THE SUB-STATION AT CROOKSTON
- THE SUB-STATION AT GRAND RAPIDS

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

Description of Departments

In the College of Science, Literature and the Arts, there is a four-year course of study leading to the degree of Bachelor of Arts. The work of the first two years is elective within certain limitations as to the range of subjects from which the electives may be chosen. The remaining work of the course is entirely elective, with the provision that a certain number of long courses be selected. The course is so elastic that it permits the student to make the general scope of his course classical, scientific or literary, to suit his individual purpose.

In this college are given also the two years of college work required for entrance to the College of Medicine and Surgery; the first two years of work of the six-year course in Science and Medicine, leading to the degrees of Bachelor of Science and Doctor of Medicine; the one year of college work required for entrance to the College of Law; and various non-professional subjects required in other schools and colleges of the University.

The College of ngineering and the Mechanic Arts was founded "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It offers courses of study, of five years each, in civil, mechanical, electrical and municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being conferred at the end of the fourth year. This college also offers work in the Graduate School leading to the degree of Master of Science.

The College of Agriculture offers a four-year course in agriculture. The degree of Bachelor of Science, in Agriculture is conferred upon completion of the course. Students in this College may specialize along the line of forestry or of home economics and secure the degree, Bachelor of Science (in Forestry, or in Home Economics).

The School of Agriculture offers a three-year course of study and is a training school for practical farm life and in domestic economy. The College of Agriculture is open to graduates of this School who have completed the fourth year of work required for admission to the College.

The Dairy School offers practical instruction in dairying, specially designed for those who are actually engaged in the manufacture of butter and cheese.

The Short Course for Farmers is designed to be of the greatest help possible to those actually engaged in farming.

The Crookston School of Agriculture offers a course of study quite similar to that given in the School of Agriculture.

The College of Law aims to educate its students by means of the study of jurisprudence, familiarizing them with the fundamental principles of positive law. Education, and not simply information, is the prime object. The power to think clearly, to reason cogently, to investigate thoroly, to generalize clearly, and to express thoughts accurately are the prime objects of legal education. The mathod of work generally pursued consists in the study of reported cases, preparing written analysis of the same, and such lectures as are necessary to give the student a symmetrical view of the science of jurisprudence. The art of practice is taught so far as possible in the law school. A system of courts embracing a court of the Justice of the Peace, and the District and Supreme Courts of the state is organized and maintained. The students pass through each of these courts in order. Students familiarize themselves with the rules of the District and Supreme courts of the state. Jury trials are conducted throughout the senior year. Appeals, motions for new trials, arguments, and all the other points of practice in the courts of the state are considered. The degree of Bachelor of Laws is granted upon the completion of the three year day course, or the four year evening course, which degree entitles the holder to admission to the bar without examination.

The College of Medicine and Surgery was established as such in 1888, the University Medical Department having been established in 1884 to examine students and confer degrees. The College provides now the only medical teaching in Minnesota, having taken over the Medical Department and students of Hamline University in 1908.

The requirements for entrance are a four year high school course including two years of Latin; and two years of college work equivalent to the academic work of this University and including at least one year each of physics, inorganic chemistry, qualitative analysis, biology and language. Four years of thirty-six full weeks of laboratory, recitational, didactic and clinical work are required in medicine.

The college is housed on the campus in six commodious modern buildings. The University owns and controls a dispensary near by and controls the St. Paul dispensary. The Elliott Memorial Hospital is in process of organization on the campus.

The Twin Cities' population of 550,000, with hospitals and dispensaries are used for teaching.

The following courses of study are offered:

1. M. D. Course.—Four years of grade study.
2. Combined B. S., M. D. Course.—Two years of required courses in the academic department, in biology, botany, mathematics, language

and economics, followed by four years of medicine, permit of the double degree in six years.

3. Combined B. A., M. D. Course.—Students presenting three years of college work in the academic department, which include the B. A. degree at the end of their required entrance studies, may take the first year in medicine.

Similar affiliations with outside colleges have been made whereby the B. A. degree is conferred by the outside colleges.

4. Training School for Nurses.—(See school bulletin).

5. Embalming School.—(See special announcement).

6. Graduate and research work is offered to qualified students.

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY offers two courses of study: A four year course of nine months each leading to the degree of M. D., requiring two years of collegiate work for admission; a six year course, the first two years in the College of Science, Literature and the Arts and the last four years in the College of Homeopathic Medicine and Surgery—at the completion of four year's work the degree of B. S. is conferred, and, on completion of the six years, the degree of M. D.—requiring the high school diploma for admission.

THE COLLEGE OF DENTISTRY offers a three-year course of study, of nine months each. Upon completion of the prescribed course the degree of Doctor of Dental Surgery is conferred.

THE COLLEGE OF PHARMACY was organized in 1891 upon request of the Minnesota State Pharmaceutical Association. In the organization and conduct of the college, the Board of Regents and the faculty have had and have the co-operation of the pharmacists of the Northwest. The college is of the University grade and maintains a high standard of entrance and graduation requirements. Every effort is made to comply with the demands of the pharmaceutical profession of the Northwest and elsewhere. The college offers a regular course extending over two or three years leading to the degree Bachelor of Pharmacy, and two post-graduate courses, the first requiring at least one additional year of resident work and leading to the degree Master of Pharmacy, and the second requiring one or two additional years of work and leading to the degree Doctor of Pharmacy. It is now contemplated to add a four-year course to include somewhat more than is now included in the regular two-year course and about two years of academic work. This course will lead to the degree Bachelor of Science in Pharmacy, and will in all respects be at least the equal of similar courses given in other University colleges of pharmacy. The course will probably be inaugurated in 1910. The Board of Regents have also authorized a course somewhat lower than the regular course now given to comply however with the requirements of the American Conference of

Pharmaceutical Facilities. This course probably will not begin until 1911 and will probably not lead to any degree or to the degree Pharmaceutical Graduate.

THE SCHOOL OF MINES was established in 1889. Its buildings and laboratories are located on the grounds of the University of Minnesota. Students of the School of Mines have therefore, all the opportunities afforded by a large university. Two regular courses of study are offered, namely, mining engineering and metallurgy, leading to the degrees of Engineer of Mines (E. M.) and Metallurgical Engineer (Met. E.), respectively. The courses in the school are designed with a view of preparing men to enter their profession with a thorough grounding in mathematics, in the sciences, and in the fundamental principles of mining engineering and merallurgy. The technical courses consist of lecture work in mining, matallurgy and allied subjects supplemented by laboratory work in assaying, chemistry, ore dressing and metallurgy; field work in plane and underground surveying; actual practical mining and metallurgical work in Minnesota and western mining centers. A system of apprenticeship during summer vacation has been inaugurated. This work has become part of the curriculum and is required of all students who are candidates for degrees.

Minnesota's enormous iron ore production continually brings before the public the necessity for trained men to aid in the development of the country's mineral resources. The state has developed its School of Mines with this end in view.

THE COLLEGE OF EDUCATION offers a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

Students are admitted to the college only after the completion of at least two full years of college work, during which time they should have pursued at least one course in general psychology, and prospective high school teachers should have given especial attention to one or more of the subjects which they expect to teach. The two years' course of study, beginning with the junior year, leads to the degree of Bachelor of Arts in Education. Preparation for teaching is planned to include a thorough grounding in the correct use of English, an adequate training in general and in educational psychology, in the history and organization of schools, in educational theory, and in the practice of teaching; and also, quite aside from the liberal training of the regular college course, specific preparation in both the subject matter and the methods of those subjects in the secondary curriculum which candidate proposes to teach. A third year leads to the degree of master of arts, including advanced studies in education and philosophy, and in one or more of the subjects of the secondary curriculum, at the option of the candidate.

In addition to the ordinary academic and professional studies connected with the training of the teacher, the college offers an opportunity for observation and practice teaching under supervision, as well as special facilities in voice culture, public school music, and physical culture, together with elementary and advanced courses in drawing, domestic art and domestic science, manual training and business education—those specialized forms of the secondary curriculum which are being introduced so rapidly into the public high schools of Minnesota.

The School of Analytical and Applied Chemistry offers three courses. Two of these, the Analytical and the five year course in Arts and Chemistry, are designed for those who wish to become teachers of chemistry, Cnalysts and investigators. The four year Analytical course leads to the degree of Bachelor of Science in Chemistry, while the five year course leads to the degree of Bachelor of Arts after four years and Bachelor of Science in Chemistry at the end of the fifth.

The third or Applied course extends over five years, leading to the degree of Bachelor of Arts at the end of four years and Chemical Engineer at the end of the fifth. These courses aim to give the student a broad foundation in chemistry and some of the allied sciences.

The two buildings occupied by the school contain six large laboratories and about twenty smaller ones well equipped for carrying on a wide range of work.

The Graduate School gathers into a single organization and unites for the purposes of administration all the activities of the University in all its schools and colleges in so far as they relate to advanced instruction offered for the second or higher degrees, viz.: Master of Arts and Doctor of Philosophy conferred for advanced, non-technical study; Master of Science and Doctor of Science for technical study; Master of Laws and Doctor of Civil Law for advanced legal studies. The privileges of this school are in general open to all Bachelors of Arts, of Science, pure and applied, and of Laws, from reputable colleges and universities having courses substantially equivalent to those at this University.

The University Summer School is organized for a six weeks' session in June and July under the direction of the State Department of Public Instruction. In the elementary section courses are given for teachers in all the common school branches and in preparation for the state teacher's certificates. In the college section courses are given for high school teachers and in preparation for the state professional certificate. Students who desire University entrance credits and credits toward the bachelor's degree may secure these by pursuing not more than two full courses at each session.

SPECIAL COURSES. In practically all of the colleges, students of mature age and adequate preparation are permitted to pursue, under the direction of the faculty, one or two distinct lines of study.

EXTENSION LECTURES. Professors in the University are prepared to give a limited number of extension lectures from time to time. For subjects, speakers , terms and dates, application should be made to the chairman of the committee on University Extension.

Historical Sketch

When Minnesota was organized as a territory March 3, 1849, it was understood that a grant of public lands would be made by Congress for the endowment and support of a university as in the case of all other states carved out of this old northwest territory.

On December 10, 1850, delegate Sibley gave notice of a bill to grant two townships (46,080 acres) which became law on February 19, 1851. Meantime the Minnesota legislature had by Act, Feb. 13, created the University of Minnesota and made over to that corporation the proceeds of all lands which Congress might grant.

The location of the institution was fixed by this law "at or near the Falls of St. Anthony," by virtue of an understanding relating to the distribution of public buildings. A board of twelve regents elected in classes by the legislature had charge till 1860. In the fall of 1851, a preparatory school was opened. In 1856 intoxicated by the boom which was then raging, the regents began the erection of the rear part of the "old main" building. Before it was finished the panic of 1857 came on. The board could not pay the contractors nor meet the interest on the bonds they had been authorized to sell.

In the winter of 1860 the legislature replaced the old board of twelve regents by one of five appointed by the Governor. At the end of four years this board had not been able to put the finances of the University on a sound footing. Senator John S. Pillsbury laid before the legislature of 1864 a plan to pay off the accumulated debt by the sale of less than one-third of the land grant. A special board of three regents, headed by Mr. Pillsbury, was created to make the experiment. At the close of 1866 this board reported the debt substantially liquidated. A debt of gratitude is due to the creditors and bondholders for scaling down their just claims and accepting sums far below their dues. By means of a small appropriation the special board renovated the building, purchased furniture and appliances, and in November, 1867, opened the preparatory department, to which girls as well as boys were admitted.

This board having accomplished its purpose prepared for the legislature the bill which enacted into law February 13, 1868, became the actual charter of the University. By far the most important element was that which united with the University endowment proper the expected income from the congressional land grant of 1862 for the support of colleges of Agricultural and Mechanic Arts.

At the close of the college year of 1869 a small company of preparatory students were found ready for college instruction. A faculty of nine professors and instructors was elected and began their work in September. In this year William Watts Folwell was appointed president.

In 1873 two students were graduated at the first commencement. Some twenty years now passed in quiet work and growth, mostly in the academic department. A good beginning was made in that of engineering and mechanic arts, but in spite of most earnest endeavors by the regents the College of Agriculture developed slowly. There was little demand for proper agricultural instruction and the pedagogy of that branch had not been developed.

In the year 1870 Congress confirmed to the state a second grant of public land for a state university ingeniously embodied in the enabling act of Feb. 26, 1857, which the departmental authorities at Washington had persistently refused to recognize.

In September, 1884, Cyrus Northrop succeeded to the presidency and not long after began that great development familiar to all.

The Colleges of Law and Medicine were organized on a self-paying basis. New buildings sprang up, nobly equipped, and the faculties were reinforced as means accumulated. The growth of the College of Agriculture has been remarkable. The congressional appropriations for experiment stations and additional endowment have greatly increased its efficiency and prosperity. The College of Engineering has also enjoyed a rapid and cumulative development. The Colleges of Pharmacy, Dentistry, the School of Mines, Chemistry, Education, and the Graduate School have been added in recent years, the result of public demands for special technical training and research.

II

OFFICERS of the UNIVERSITY

The Board of Regents

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The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee
The University press committee
The committee on athletics
The committee on University relations to other institutions of higher learning
The committee on health and sanitation
The committee on commencement and other University functions
The committee on catalogue, programs and courses of study
The committee on student entertainments and social affairs
And such other committees as the general University interests may require.

b) Receive reports from such committees and make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

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Professor J. C. Hutchinson
Professor Carl Schlenker
Professor Norman Wilde

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The College and School of Agriculture

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The University Library

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General Alumni Association

David P. Jones

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The University Auditing Committee

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The Committee on Athletics

PROFESSORS PAIGE, HARDING, D. P. JONES, LITZENBERG, ROBINSON

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, FLETCHER, FRANKFORTER, RANDALL, WESBROOK

The Committee on Catalogue, Programs and Courses of Study

PROFESSORS GRAY, FLETCHER, A. E. HAYNES, JOHNSTON, SNYDER, E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BEACH, CONSTANT, JOHNSTON, ROBINSON

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JAMES, KIRCHNER, PATTEE, RANDALL, SCHLENKER, DR. SCOTT, WILDE

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, CLEMENTS, COMSTOCK, COOKE, OWRE, PIKE

The Committee on University Relations to other Institutions of Higher Learning

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The Committee on University Extension and University Lectures

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Henry L. Williams, M.D. 1301 5th St. S. E.
Director of Athletics, Clinical Instructor in Diseases of Women

Hugh E. Willis, M.A., LL.M. 417 Delaware St. S. E.
Assistant Professor of Law

John W. Willis, Ex-Judge of District Court of Minn., 923 Summit Ave. St. Paul
Special Lecturer on Lawyers, Oriental, Medieval and Modern

Louis B. Wilson, M.D. Rochester, Minn.
Assistant Professor of Clinical Pathology

Frederick J. Wulling, Ph.G., Phm.D., LL.M. 3305 2nd Ave. S.
Dean of the College of Pharmacy and Professor of Pharmacology

Anthony Zeleny, M.S., Ph.D. 321 Church St. S. E.
Assistant Professor of Physics

John Zeleny, B.S., B.A., Ph.D. 915 6th St. S. E.
Professor of Physics

INSTRUCTORS

Fred L. Adair, B.S., M.D. 3232 Irving Ave. S.
Clinical Instuctor in Obstetrics

Cephas D. Allin, M.A., LL.B. 1005 University Ave. S. E.
Instructor in Political Science

E. Villiers Appleby, M.D. Minnesota Club, St. Paul
Clinical Instructor in Ophthalmology

Gustave Bachman, Phm.D. 612 15th Ave. S. E.
Instructor in Pharmacy

Walter Badger, B.A., B.S. Chem. 3311 Portland Ave.
Instructor in Chemistry

Charles R. Ball, M.D. 1510 Summit Ave., St. Paul
Clinical Instructor in Nervous and Mental Diseases

George C. Barton, M.D. 4047 Park Blvd.
Clinical Instructor in Gynecology

L. B. Bassett 2095 Dudley St. St. Paul
Instructor in Agriculture

Arthur E. Benjamin, M.D. 2222 Blaisdell Ave.
Clinical Instructor in Diseases of Women

Emma Bertin 1223 4th St. S. E.
Instructor in French

Margaret J. Blair 1416 Raymond Ave., St. Paul
Instructor in Sewing and Household Art

Fannie C. Boutelle Agricultural College
Instructor in Domestic Economics

H. A. Bowman, M.D. 2317 Polk St.
Clinical Instructor in Physical Diagnosis

Charles H. Bradley, M.D. 2117 Portland
Clinical Instructor in Medicine

John B. Brimhall, M.D. 74 Central Ave., St. Paul
Clinical Instructor in Orthopedic Surgery

H. A. Britzius, M.A., M.S., 2806 Aldrich Ave. N.
Instructor in Technique

A. M. Bull 2237 Knapp, St. St. Paul
Instructor in Drawing

Mary Bull 1385 Raymond, St. Paul
Instructor in Domestic Science

Frank E. Burch, M.D. 706 Grand Ave., St. Paul
Clinical Instructor in Diseases of the Eye and Ear

Anna M. Butner The Concord
Instructor in Physical Culture

Frederick K. Butters, M.S. 815 S. 7th St.
Instructor in Pharmaceutical Botany, Microscopy and Pharmacognosy.

LeRoy Cady, B.Agr. 2081 Buford St., St. Paul
Instructor in Horticulture

R. A. Campbell, M.D. Century Building, St. Paul
Clinical Instructor in Rhinology and Laryngology

Henrietta Clopath 701 Delaware St.
Intsructor in Drawing

W. O. Clure 209 Pleasant St. S. E.
Instructor in Rhetoric

Lillian Cohen, M.A. 415 Fourteenth St. E.
Instructor in Chemistry

William H. Condit, B.S., M. D. 1018 4th St. S. E.
Instructor in Therapeutics and Materia Medica

George M. Coon, M.D. 916 Hague Ave., St. Paul
Clinical Instructor in Genito-Urinary Diseases

T. P. Cooper, B.S. in Agr. St. Anthony Park
Instructor in Agriculture

John L. Coulter, M.A. 815 6th St. S. E.
Instructor in Economics

Norman J. Cox, B.S., D.M.D. 986 15th Ave. S. E
Instructor in Operative Dentistry

Josephine Craig 2090 Commonwealth Ave., St. Paul
Instructor in Agricultural Chemistry

J. Grosvenor Cross, B.S., M.D. 422 Ridgewood Ave.
Clinical Instructor in Medicine

Alvin S. Cutler, C.E. 529 Oak St. S. E.
Instructor in Railway Engineering

J. M. Damon, D.D.S. 30 W. 37th St.
Instructor in Prosthetic Dentistry and Dental Anatomy

Warren A. Dennis, B.S., M.D. 657 Goodrich, Ave., St. Paul
Clinical Instructor in Surgery
Charles F. Dight, M.D. Minneapolis
Instructor in Pharmacology
C. F. Disen, M.D. 2600 E. 22nd St.
Demonstrator of Anatomy
J. M. Drew 1307 Chelmsford, St. St., Paul
Instructor in Blacksmithing and Poultry, Registrar of the School of Agriculture.
A. W. Dunning, M.D. 807 Ashland, Ave.,St. Paul
Clinical Instructor in Nervous and Mental Diseases
J. L. Edmunds, B.S. in Agr. St. Anthony Park
Instructor in Animal Husbandry
R. E. Farr, M.D. 2524 Clinton Ave.
Clinical Instructor in Surgery
Edward Fidlar, B.A., M.D. 425 12th Ave. S. E.
Junior Demonstrator of Pathology and Bacteriology
Oscar W. Firkins, M.A. 1528 4th St. S. E.
Instructor in English and Rhetoric
Henry J. Franklin, Ph.D. 1472 Raymond Ave., St. Paul
Instructor in Entomology
Francis C. Frary, M.S. 1307 6th St. S. E.
Instructor in Chemistry
W. H. Frazier, B.S. 1155 Raymond Ave., St. Paul
Instructor in Agricultural Chemistry and Soils
James Gilfillan, M.D. 287 So. Exchange St. St. Paul
Clinical Instructor in Medicine
Haldor B. Gislason, B.A., LL.B. 217 Harvard St. S. E.
Instructor in Rhetoric
H. S. Godfrey, D.M.D. 1117 Harmon Place
Instructor in Operative Dentistry
Judd Goodrich, M.D. 300 Goodrich Ave., St. Paul
Clinical Instructor in Surgery
Robert L. Green, D.D.S. 3210 15th Ave. S.
Instructor in Operative Dentistry
C. P. Grout, B.S. in Agr. St. Anthony Park
Instructor in Dairy Husbandry
Frank F. Grout, B.S. 1202 7th. St. S. E.
Instructor in Geology and Mineralogy
Charles A. Griffith, D.D.S. 420 13th Ave. S. E.
Instructor in Operative Dentistry
George D. Haggard, M.D. 2400 Chicago Ave.
Instructor in Physiology

Arthur S. Hamilton, B.S., M.D. Instructor in Pathology of the Nervous System	600 Washington Ave. S. E.
John A. Handy, Ph.C. Instructor in Chemistry	220 Harvard S. E.
W. F. Handschin Instructor in Animal Husbandry	St. Anthony Park
Earle R. Hare, B.S., M.D. Instructor in Anatomy	327 14th Ave. S. E.
Mary V. Hartzell, D.M.D. Instructor in Comparative Dental Anatomy	2508 Pillsbury Ave.
Rowland Haynes, M.A. Instructor in Psychology	606 7th St. S. E.
George D. Head, B.S., M.D. Instructor in Clinical Microscopy	56 Dell Place
A. C. Heath, M.D. Clinical Instructor of Diseases of the Nose and Throat	516 Portland Ave., St. Paul
U. E. Heddy, D.D.S. Instructor in Crown and Bridge Work	710 21st Ave. S.
P. A. Hoff, M.D. Clinical Instructor in Medicine.	225 Arundel Ave., St. Paul
Charles M. Holt, B.A. Instructor in Education	Waverly Hotel
Olaf Hovda, B.A. Instructor in Engineering Mathematics	1519 7th St. S. E.
H. W. Jones, M.D. Clinical Instructor in Nervous and Mental Diseases	2418 W. 22nd St.
R. R. Jones, D.D.S. Instructor in Operative Dentistry	4320 Upton Ave.
Leulah H. Judson, M.A. Instructor in History	1221 5th St. S. E.
A. R. Kohler, B.S.A. Instructor in Horticulture	1455 No. Cleveland Ave., St. Paul
Alois F. Kovarik, M.A. Instructor in Physics	1523 7th St. S. E
W. F. Lasby, B.S., D.D.S. Instructor in Prosthetic Dentistry	602 Essex St. S. E.
Arthur A. Law, M.D. Instructor in Operative Surgery	1912 Hennepin Ave.
Harry C. Lawton, D.D.S. Instructor in Prosthetic Dentistry and Dental Anatomy	489 Grand Ave. St. Paul
J. F. Lemstrom, M.D. Instructor in Histology and Embryology	115 N. 12th St.
Charles N. McCloud, Phm.D., M.D. Lecturer on First Aids to the Injured	965 Selby Ave., St. Paul

Jeanette M. McLaren, M.D. 441 Selby Ave., St. Paul
Clinical Instructor in Obstetrics
J. S. MacNie, M.D. 2113 Bryant Ave. S.
Clinical Instructor in Diseases of the Eye and Ear
James E. Manchester, Sc.D. 405 Oak St. S. E.
Instructor in Mathematics
Herman A. Maves, D.D.S. 711 Douglas Ave.
Instructor in Operative Dentistry
Carl M. Melom, M.A. 506 15th Ave. S. E.
Instructor in French and Spanish
Martha B. Moorhead, M.D. 914 2nd Ave. So.
Lecturer in Domestic Hygiene
Oscar B. Nelson, C.E. 1827 14th Ave, So.
Instructor in Civil Engineering
William B. Newhall, M.E. 2702 Humboldt Ave. So.
Instructor in Civil Engineering
Charles W. Nichols, M.A. 313 8th Ave. S. E.
Instructor in Rhetoric
Wallace Notestein, Ph.D. 812 4th St. S. E.
Instructor in History
Oscar Owre, M.D. 511 W. Franklin Ave.
Instructor in Oral Surgery
E. H. Parker, M.D. 1311 Yale Place
Clinical Instructor in Diseases of Nose and Throat
Peter Peterson 3709 Clinton Ave.
Instructor in Foundry Practice
Raymond V. Phelan, Ph.D. 1629 University Ave. S. E.
Instructor in Economics
Jay N. Pike, D.D.S. 1617 Franklin Ave.
Instructor in Orthodontia.
C. E. Pyle, B.S., D.V.M. 2225 Langford Ave., St. Paul
Instructor in Domestic Bacteriology
Edward Quigley 2442 15th Ave. S.
Instructor in Forge Work
Walter R. Ramsey, M.D. The Angus, St. Paul
Clinical Instructor in Diseases of Children
Jean Rankin, M.A. 916 5th St. S. E.
Instructor in Education
Soren P. Rees, B.S., M.D. 1721 James Ave. S.
Instructor in Physical Diagnosis and Clinical Medicine
H. M. Reid, D.D.S. 2014 Queen Ave. S.
Instructor in Prosthetic Dentistry
William H. Richards 416 Havard St. S. E.
Instructor in Carpentry and Pattern Work

Harry P. Ritchie, Ph.B., M.D. 46 Crocus Place, St. Paul
Clinical Instructor in Surgery

H. E. Robertson, B.A., M.D. 627 Oak St. S. E.
Demonstrator in Pathology

H. B. Roe Agricultural College
Instructor in Mathematics

Bert A. Rose 41 S. 6th St.
Instructor of Cadet Band

Norman W. Rose, M.E. 406 Oak St. S. E.
Instructor in Drawing

Frank B. Rowley, B.S., M.E. 311 Havard St. S. E.
Instructor in Drawing

A. G. Ruggles, M.A. 1465 Raymond Ave., St. Paul
Instructor in Entomology

William T. Ryan, E.E. 1406 7th St. S. E.
Instructor in Electrical Engineering

J. Francis Schefcik, B.S., Ph.G., M.D., C.M. 1400 Spruce Place
Instructor in Materia Medica

Julius Parker Sedgwick, B.S., M.D. 2015 Kenwood Parkway
Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children.

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Clinical Instructor in Medicine, and Instructor in Therapeutics

Juniata Shepperd, M.A. Agricultural College
Instructor in Domestic Science

S. Carl Shipley, B.S., M.E. 209 State St. S. E.
Instructor in Machine Work

Charles F. Shoop, B.S. 1916 14th Ave. N.
Instructor in Mechanical Engineering

Royal R. Shumway, B.A. 716 12th Ave. S. E.
Instructor in Mathematics

Anna M. Smith 1485 Raymond Ave., St. Paul
Librarian School of Agriculture

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Clinical Instructor in Diseases of the Eye and Ear

Edith Staples St. Anthony Park
Instructor in Domestic Art

Thomas W. Stumm, M.D. 394 Selby Ave. St. Paul
Clinical Instructor in Medicine

Samuel E. Sweitzer, M.D. 1729 Irving Ave. S.
Clinical Instructor in Dermatology and Genito-Urinary Diseases.

C. C. Tyrrell, B.A., M.D., 2428 Central Ave.
Prosector in Anatomy

Henry Ubrich 602 Buchanan St. S. E.
Instructor in Carpentry

Henry L. Ulrich, M.D. 519 1st Ave. S.
Assistant in Clinical Microscopy

J. A. Vye 1449 Cleveland Ave. N., St. Paul
Instructor in Farm Accounts and Secretary of the Experiment Station.

J. A. Watson, M.D. 1303 Yale Place
Clinical Instructor in Diseases of Nose and Throat

Amos S. Wells, B.A., D.D.S. 3901 Lyndale Ave. N.
Instructor in Crown and Bridge Work

Andrew J. Weiss 3705 Stevens Ave.
Instructor in Technics

H. B. White, B.S.A. School of Agriculture
Instructor in Carpentry

Nellie A. Whitney, B.A. 4432 Stevens Ave.
Instructor in Rhetoric

Grace B. Whitridge 654 Hague Ave., St. Paul
Instructor in Physical Culture

Van H. Wilcox, M.D. 812 Pillsbury Building
Instructor in Operative Surgery

A. D. Wilhoit, M.A. 1155 Raymond Ave., St. Paul
Instructor in Agricultural Chemistry and Soils

Charles Williams, M.A. 312 Union St. S. E.
Instructor in German

Archie D. Wilson, B.Agr. 1466 Raymond Ave., St. Paul
Instructor in Agriculture

Richard Wischkaemper 516 Beacon St. S. E.
Instructor in German

Frank R. Wright, D.D.S., M.D. 713 Pillsbury Building
Instructor in Anaesthesia and Oral Surgery.

James Zimmerman, B.A. 1201 5th St. S. E.
Instructor in Chemistry

III

EQUIPMENT

Equipment

GROUNDS AND BUILDINGS

The twenty-three buildings of the University used by all departments of instructoin save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University avenue and the river and between eleventh and nineteenth avenues southeast, in the city of Minneapolis. The campus is well wooded with a fine grove of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement. At the last session of the legislature provision was made for the expenditure of four hundred fifty thousand dollars in campus enlargement during the course of the years 1907-1909. Private benefactors have added fifty thousand dollars to that amount. Condemnation proceedings are now in progress for the purpose of obtaining the land desired. About thirty additional acres situated to the south of the present campus will probably be secured· The Department of Agriculture, including the college and school of agriculture, has a separate campus at St. Anthony Park, in the city of St. Paul, where are located the twenty-five buildings provided for this department and the state experiment station. Adjoining this campus is the University farm of about four hundred twenty acres.

ASTRONOMICAL OBSERVATORY

The astronomical observatory contains a ten and one-half inch refracting telescope furnished with a third lens for converting it into a photographic telescope; a filar micrometer; a spectroscope by Brashear; a meridian circle and zenith telescope; a Repsold photographic measuring machine, a chronograph, and astronomical clocks.

GYMNASIUM

The gymnasium is located in the armory, and is well equipped with a variety of gymnastic appliances. The object of the gymnasium is to provide all of the students of the University opportunity for exercise to build up their general health. It also provides special training to correct physical defects and functional derangements. The gymnasium is in charge of a professional medical director and assistant, and the training is under their direct supervision. A thorough physical examination is offered each student immediately before and after the gymnasium course, and a record is made of the same. The examination of these records shows a marked improvement in the standard of health of the average student during his college course. The gymnasium is open at all times to all young men in the University who are free to use the apparatus and to pursue a course of physical training under the direct supervision of the director and his assistant. In some of the colleges of the University this work is required of all men.

MILITARY DRILL

The Act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in military science and tactics at all institutions that are its beneficiaries. The armory is located on the University campus and has all the facilities usually provided in a modern armory. The United States government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

THE ONE-MILE LIQUOR LAW

A state law provides that "it shall be unlawful for any person to sell or dispose of any spirituous, vinous, or malt liquors within the distance of one mile of the Main Building of the University of Minnesota, as now located in the city of Minneapolis; provided that the provision of this section shall not apply to that part of the city of Minneapolis lying on the west side of the Mississippi River."

ATHLETIC ORGANIZATIONS

The ATHLETIC ASSOCIATION is an organization having for its object the general physical well-being of the students and the encouragement of a proper spirit in favor of hearty, manly sports.

BOARD OF CONTROL FOR ATHLETICS. The athletic sports of the University are under the supervision of a board of control made up of eleven members; two are members of the faculty, two are alumni, and seven are students. This board arranges the schedule of games, manages the finances, and exercises a general supervision over all matters connected with athletic contests. It has charge of the whole of the athletic grounds of the University, Northrop Field. This field, containing about six acres, lies immediately adjoining the armory. It contains a modern cinder track, tennis courts, baseball diamond, and football gridiron. The grand stands have a seating capacity of about fifteen thousand. A large portion of this field was a gift to the University from the heirs of the late John S. Pillsbury, and the brick wall surrounding it is the gift of his son, Mr. A. F. Pillsbury. It is generally conceded to be one of the finest fields in the West.

MUSEUMS AND COLLECTIONS

The museums of the University contain material obtained from various sources, arranged with special reference to its use for illustration. Among the more notable collections are the following:

GEOLOGY AND MINERALOGY. This museum includes the Kunz collection of minerals, purchased of George F. Kunz; several suits of crystalline rocks secured from various sources; the Ward collection of casts contributed in part by citizens of Minneapolis; collection of rocks, fossils, minerals and economic products of Minnesota; upwards of 9,000 entries gathered by the geological survey of the State; the Sardeson collection of paleozoic fossils of Minnesota, Wisconsin, Iowa, and neighboring states, comprising 30,000 specimens; a series of 3,000 thin sections of typical rocks and minerals largely representing Minnesota localities; purchased material comprising a fine collection of crystals; 5,000 minerals and 3,000 specimens of economic minerals and crystalline rocks, and a collection of over 4,000 photographs and lantern slides.

Mr. Arus S. Williams, of Minneapolis, has given to the University his extensive collection of negatives and photographs. During many years of active work as a photographer, he has collected a series of several thousand plates representing geologic and geographic subjects, commercial views and historic scenes. These will prove of great value in illustrating the physical, commercial and political history of the State. They are recognized as the A. S. Williams collection of Photographs and Photographic Negatives.

ZOOLOGY. The zoological museum contains all the material collected by the Zoological survey; a collection of mounted Minnesota birds representing about one-third of the species found in the state; a number of the mammals of the state and a few from the more western states; a collection of fishes, molluscan shells, Philippine Island corals and other foreign material.

The ornithological room contains the excellent Thomas S. Roberts and Franklin Benner collection of skins, nests and eggs of Minnesota birds. The entomological collectian contains over 3000 named Minnesota insects, is particularly rich in aphidæ and contains the Guthrie collection of collembola. Other groups of animals are more or less numerously represented, and are receiving annual additions from the Zoological Survey.

BOTANY. The material forming the museum in botany includes the general herbarium numbering about 400,000 specimens and comprising the series of plants collected by the state botanist; an alcoholic collection of material for dissection; a collection of woods of Minnesota; a limited series of carboniferous and cretaceous fossil plants, including the Lesquereaux collection from the Minnesota River localities.

MINING AND METALLURGY.—A museum of mining and metallurgy is located in the mining building. Representative ores of all the most important metals, drawings, photographs of furnaces, sectional furnace models and samples of all the different furnace products are exhibited to the public and are used as illustrative material for regular classes. Various mine appliances, pieces of machinery, underground photographs, models of mine timbering with sectional maps of some of the large Minnesota properties, complete the collection. A collection has been begun of ores from all the important mines on the Mesabi range. These samples with analyses show well the character of ore produced by the state.

SOCIOLOGY AND ANTHROPOLOGY. This department has recently acquired wall-charts and maps which present graphically a large number of sociological facts, from various parts of the United States; a collection of plaster-cast crania and skulls showing man's ancestors, fossil man from western Europe, typical members of the various living races and sub-races, both normal and artificially deformed; a collection of face-masks in color, presenting well the Oceanic peoples; a series of busts in white, presenting facial and cranial characteristics of a considerable number of different peoples; natural cranial, skull and skeletal materials from some dozen different continental and insular geographic areas; and the Guthrie collection of ethnologic specimens from the Bulu tribe of Kamerun province, Africa, presenting the material culture of a savage people in the Tropics.

TECHNOLOGY. A cabinet of specimens illustrating the products and processes of applied chemistry is being collected by the professor of chemistry, as opportunity offers. The collection embraces fuel, ores, furnace products, textile materials, both raw and manufactured, dyewoods and other materials used in dyeing; specimens illustrating the bleaching and printing of cotton, linen and woolen goods, earthenware, pottery, etc.

CLASSICS. Some material illustrating classical geography, topography, chronology, mythology, and art has been collected, consisting mainly of plans and charts, casts, pictorial illustrations, fac-similes of manuscripts and inscriptions.

ENGLISH. A few fac-similes of manuscripts, plates that may serve the purpose of archeological instruction, publication of texts, reprints of blackletter books and of original editions, photographs and portraits have been gathered.

CIVIL ENGINEERING. The department is collecting samples of road material typical of the various localities of the State, and leading materials used in street paving, such as granite, trap rock, brick and asphaltum. A set of standard sections of steel and wrought iron is provided for illustration in the study of structural design.

MECHANICAL ENGINEERING. The collection consists of models of mechanical motions especially relating to the work in kinematics; sectioned apparatus, such as steam engines, pumps, valves, injectors, water meters and steam separators; various collections of drop forgings in iron, steel and copper; miscellaneous samples of commercial work representing the product of special machines; groups of standard nuts, bolts and screws; samples of belting, ropes, steel and iron cables, rawhide gears, pipe fittings and other material especially useful for illustrative purposes.

ELECTRICAL ENGINEERING. This museum contains a growing collection of samples furnished by various manufacturers and dealers for demonstrating the merits of different products and for illustrating modern practice; an excellent collection showing the development of electrical instruments, telephone apparatus, measuring instruments, lightning arresters, switches, primary and secondary batteries, early forms of dynamos and motors, lighting apparatus and various industrial applications of electricity; also a collection of samples from repair shops and elsewhere, illustrating the effects of wear, accidents and abuse.

ENGINEERING MATHEMATICS. This department has recently added to its apparatus used for illustration in teaching, several types of slide-rules, including those of Thatcher, Faber, Keuffel and Esser, Schureman's Computer, Boucher's Calculator; also Amsler's Polar Planimeter.

MATHEMATICS. The collection includes the Schroeder wooden and the Schilling gypsum, string and paper models for Solid Analytical Geometry, many of the Schilling models for illustrating the Theory of Surfaces, several of the Schilling mechanical devices for describing various loci, the Keufel and Esser models for Solid Geometry, and large slated globes, suitably mounted, for use in Spherical Geometry and Spherical Trigonometry.

LIBRARIES

THE UNIVERSITY LIBRARY CONSISTS OF:

1. The general library.
2. The college libraries, including those of law, medicine, engineering, agriculture, and mines.
3. The departmental libraries, including those of arts, astronomy, animal biology, botany, chemistry, French, geology, German, Greek, Latin, mathematics, military science, physics, rhetoric, and Scandinavian.

The whole number of bound volumes owned by the University is about one hundred and twenty thousand, unbound books and pamphlets about twenty thousand. About seven hundred and thirty current periodicals are received.

The general library is open to students and the public from eight A. M. to ten P. M. except Sundays and legal holidays.

The departmental libraries are designed especially for the work of their respective departments and consist mainly of books of reference and current periodicals relating to technical subjects. The private collections of the professors are usually available upon application when necessary for research.

Besides the University library the following libraries are easily accessible: the Minneapolis public library, containing over one hundred sixty thousand bound volumes and over fourteen hundred of the leading newspapers, magazines and periodicals of the world; the St. Paul public library with about ninety-five thousand volumes; the Minnesota Historical Society library of about eighty-five thousand volumes, and the state library of about fifty-nine thousand volumes in the capitol in St. Paul; the Minnesota Academy of Natural Sciences library of twelve thousand titles.

IV

ASSISTANTS, SCHOLARSHIPS, LOANS AND PRIZES

Assistants, Scholarships, Loans and Prizes

ASSISTANTS

It is the policy of the University to encourage graduate study and to provide for assistance in laboratories, reading of test and examination papers, supervision of note books, and similar services by the appointment of assistants in departments where such services are required. The general principles which now control the making of such appointments are: (1) the appointments are made by the board of regents, upon the nomination of the head of the department concerned and its ratification by the dean of the college; (2) appointments are for one year only, but may be renewed; (3) the appointees must be graduate students, who are taking work along the lines of the assistantships to which they are appointed; (4) assistants are not regularly placed in charge of classes, and when exceptions are made to meet emergencies, the arrangement is regarded as a temporary one, and in no case to extend beyond the current year.

SCHOLARSHIPS

THE MOSES MARSTON SCHOLARSHIP IN ENGLISH

Friends and pupils of the late Professor Moses Marston have given one thousand dollars as a memorial fund. The annual income of the fund is to be used to help some student in the English course. The award of the income is made on the basis of pecuniary need and of deserving scholarship.

THE ALBERT HOWARD SCHOLARSHIP FUND

Under the last will and testament of Mr. James T. Howard, of the town of St. Johnsbury, Vermont, $4,166.81 was left to the University to establish a scholarship to be known as the Albert Howard Scholarship. This scholarship is assigned by the executive committee of the board of regents upon the recommendation of the faculty.

THE COLLEGE WOMEN'S CLUB SCHOLARSHIP

The College Women's Club of Minneapolis has established a scholarship for the benefit of women students in this University. For the year 1909-10 this scholarship amounts to $150. In awarding it the preference will be given to students in the junior and senior classes and to graduate students. Application for this scholarship may be made to Miss Comstock, Dean of Women.

STUDENT LOAN FUNDS

THE GILFILLAN TRUST FUND

The Hon. John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the board of regents to assist worthy students, needing such aid, to secure an education. The regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the regents for the administration of the fund may be learned by addressing the President of the University.

THE ELLIOT SCHOLARSHIP LOAN FUND

To fulfill the wishes of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of $5,000 was placed in the hands of the board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest at the earliest convenience of the recipients.

THE PURITAN COLONY SCHOLARSHIP LOAN

The Puritan Colony of the National Society of New England Women has established a loan fund for women students of the University. For the year 1909-10 this scholarship loan amounts to one hundred dollars It is available for women students of New England birth or ancestry. In awarding it the preference will be given to young women in the junior and senior classes. Application for it may be made to Miss Comstock, Dean of Women.

STUDENTS' TRUST FUND

The class of 1902 left with the School of Agriculture a fund of $100 "to assist by temporary loans at a reasonable rate of interest, deserving students needing such help, who are not below the B class in the School of Agriculture." This fund is in charge of a committee constisting of the secretary, the principal, the preceptress, and the president of the A class.

THE LUDDEN TRUST

The Honorable John D. Ludden, of St. Paul, gave the University of Minnesota $5,000 to be held, invested and re-invested by the University, through its Board of Regents, and the income thereof to be collected, received and applied by said Board of Regents to the financial assistance of students of either sex in the school of agriculture..

This fund produces $200 a year. Those wishing to avail themselves of its benefits should apply to the executive committee of the Board of Regents of the University of Minnesota.

Mr. Ludden has since donated another $5,000 for a like purpose so that the yearly income is now $400.

PRIZES

THE JOHN S. PILLSBURY PRIZE

Three prizes of one hundred, fifty, and twenty-five dollars each, offered by the heirs of the late John S. Pillsbury, are awarded for the best work in the department of rhetoric, as evidenced finally by an oration in public.

THE '89 MEMORIAL PRIZE IN HISTORY

The class of 1889, at graduation, established a prize of twenty-five dollars each year, to be known as the '89 Memorial Prize, and to be given for the best thesis in history by a member of the graduation class. The award is made by a professor of history in some other institution.

THE WILLIAM H. DUNWOODY PRIZE

Mr. William H. Dunwoody has provided a cash prize of seventy-five dollars for the members of the team winning the inter sophomore debate, and another prize of twenty-five dollars for the student in the sophomore class writing and delivering the best oration.

THE FRANK H. PEAVEY PRIZE

Mrs. Frank T. Heffelfinger continues the prize of one hundred dollars. established by her father, the late Frank H. Peavey. This prize consists of seventy-five dollars for the members of the team winning the freshman-sophomore debate, and another prize of twenty-five dollars to the student in the freshman or sophomore class writing and delivering the best oration.

THE JAMES T. WYMAN PRIZE

A prize of twenty-five dollars is offered by the Hon. James T. Wyman, of Minneapolis, through the department of economics and political science, for the best essay of three to five thousand words by an undergraduate student, on the subject of "The Influence of Immigration upon the Development of the Northwest."

THE WILLIAM JENNINGS BRYAN PRIZE

The Hon. William Jennings Bryan has given the University the sum of two hundred dollars for the encouragement of studies in political science. The annual income will be given as a prize to the writer of the best essay upon the topic to be announced each year. The competition is open to all students of the College of Science, Literature, and the Arts.

THE FRANK O. LOWDEN PRIZE

The Hon. Frank O. Lowden, of Chicago, offers as a prize to be competed for by the Northern Oratorical League, an endowment of three thousand dollars, which will yield an annual income of about one hundred seventy-five dollars. A prize of one hundred dollars will be given to the orator winning the first place, fifty dollars to the orator winning second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

THE ROLLIN E. CUTTS PRIZE IN SURGERY

Dr. Mary E. Smith Cutts, '91 Medical, has given to the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of $500.00, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

THE BRIGGS PRIZE IN FOUNDRY PRACTICE

For the encouragement of studies in foundry practice, Mr. O. P. Briggs, commissioner of the National Foundrymen's Association, Detroit, Mich., offers $75 annually, in two prizes, which are to be accompanied by gold medals. The competition is open to sophomores in the College of Engineering, and the prize will be awarded for the best essay relative to the above subject. No prize will be awarded if less than five essays are submitted in competition. Essays should contain about 3,000 words, and must be submitted to the professor of rhetoric on or before May 1st.

THE GEORGE C. ANDREWS PRIZE

Mr. George C. Andrews, M. E. '87. has offered an annual prize to the Senior Mechanical Engineers for the best essay on any subject connected with heating and ventilation. The prize in this contest will consist of $50.00 in cash accompanied by a suitable medal; a second prize will also be given which will consist of $25.00 in cash accompanied by a medal. The winner of the first prize will be offered a position with the George C. Andrews Heating Company.

PHARMACEUTICAL ASSOCIATION PRIZE

Nomination for membership in the American Pharmaceutical Association and the first year's dues are offered annually by Dean Wulling to the student in the College of Pharmacy earning the highest total average of all standings.

V

STUDENT ORGANIZATIONS AND PUBLICATIONS

Student Organizations and Publications

RELIGIOUS ORGANIZATIONS

The Students' Christian Association was organized in 1869, its object being to promote growth in Christian character, and to engage in such religious work as may be deemed expedient and necessary. The association owns a commodious building, which serves as the headquarters for student religious activity. All persons in sympathy with the object of the association are eligible to membership.

The Young Men's Christian Association has as its obect the promotion of "growth in grace and Christian fellowship among its members and aggressive Christian work, by and for students." This association leases the Students' Christian Association building and keeps it constantly open, with a general secretary in charge. All men in sympathy with the object of the association are eligible to membership. This building is maintained as the social and religious headquarters of all young men in the University.

This association provides an employment bureau whose serivces are free to students in all departments of the institution, as well as a committee to help students find comfortable rooms and boarding places. The association also maintains an educational department in which students may make up their entrance conditions at a nominal charge for instruction. The general secretary will be pleased to correspond with any young man intending to come to the Univesity. Any inquiry about board, room, employment, or general information will gladly be answered, and a hand-book will be sent to anyone wishing it. Address the general secretary of the Young Men's Christian Association, University of Minnesota, Minneapolis, Minnesota.

The Young Women's Christian Association is the center of Christian life among the women of the University. Its object is "to deepen spiritual thought in the University women, to environ her with a semblance of home, to bring to her friendship, assistance and sociability by stimulating student fellowship, to give her personal help when necessary; thus developing in her the Christ ideal of culture in womanhood."

To this end frequent socials and informal teas are given throughout the year; twice each week twenty-minute prayer meetings are held; a dozen circles meet one hour a week for devotinal Bible study; and from time to time missionary meetings are held. The general secretary devotes all of her time to the association and will be pleased to correspond with any young woman who wishes information regarding the University.

All young women are invited to visit the Young Women's Christian Association before registering. Women from the upper classes will be there during the opening days to give advice and assistance.

The Bishop Gilbert Society was organized by the Episcopal students, about three years ago. The purpose of the organization is to promote the religious influences of the Episcopal students in the University. Prominent speakers address the society during the year. Besides this, the society tends to promote good fellowship among its members. A club house has been planned and will soon be in process of construction.

The University Catholic Association was organized by the Catholic students in the spring of 1900. The purpose of the association is the study of the Bible and of the doctrines and history of the Catholic Church. Membership is open to anyone connected with the University. Regular meetings are held every Sunday afternoon in the rooms of either the Young Men's or Young Women's Christian Association, through the courtesy of these organizations. The association is planning to erect a building near the campus at an early date.

Aside from the religious objects, the association tends to promote good fellowship among its members. Early in each University year a reception is tendered to new students and during the year two or more socials are held. Further information may be obtained by addressing the secretary of the association at the University.

LITERARY, SCIENTIFIC, AND MUSICAL ORGANIZATIONS

Phi Beta Kappa. A chapter of the honorary society of Phi Beta Kappa was established at the University in 1892. A small proportion of the graduates of the College of Science, Literature, and the Arts are elected to membership each year. Election is based upon high scholarship and character.

Sigma Xi. A chapter of the honorary scientific society of Sigma Xi was established at the University in 1896. A small proportion of the graduates of the scientific and technical departments are elected to membership each year. Election is based upon high scholarship and character.

The Graduate Club is a club organized for the purpose of fostering a greater interest in graduate work, for mutual help, and for discussion of topics under investigation.

The Minnesota Literary Union is a federation of the members of the following societies: Shakopean, Forum, Castalian, Minerva, and Arena. Four meetings are held each year.

Literary Societies. The above named literary societies of the

Minnesota Literary Union are mainly debating clubs. Every student is welcome to attend the literary sessions, but the business sessions are usually held behind closed doors. Students desiring to join should make early application to some member of the society he prefers, as the membership is limited. Membership limit: Shakopean 35 men; Forum 30 men; Minerva 30 women; Law Literary, unlimited, law students; Castalian 35 men; Theta Epsilon 30 women; Thalian 25 women; Acanthus 30 women.

THE DEBATING BOARD has charge of home and inter-collegiate oratorical contests.

THE NORTHERN ORATORICAL LEAGUE is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, Oberlin College, the State University of Iowa, the University of Chicago, and the University of Minnesota. Its purpose is to foster an interest in public speaking and to elevate the standard of oratory by holding annual contests. The contests are open only to undergraduates.

THE DRAMATIC CLUB is organized for the study and practice of dramatic art.

THE EUTERPEAN CLUB is a regularly organized body of singers, composed of forty of the women students of the University. The selection of voices is made at the beginning of each school year. The club is under the direction of Professor Scott.

THE GLEE AND MANDOLIN CLUBS give a public concert each year at the University and make a tour of the state during the holidays.

THE UNIVERSITY BAND is organized as a part of the military system of the University and is composed of about sixty musicians. It is under the efficient leadership of an instructor in music, and furnishes music for military and many other University affairs.

AMERICAN CHEMICAL SOCIETY. A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

THE SOCIETY OF ENGINEERS meets once in two weeks to listen to addresses by prominent engineers and for the discussion of various engineering topics. The Year Book of this society is published annually. It is devoted to the publication of articles upon engineering subjects by professors and students.

THE SCHOOL OF MINES SOCIETY meets once a month to listen to addresses by students, alumni and well-known mining and metallurgical engineers on various topics interesting to the professions. All students regularly registered in the School of Mines are eligible to membership. This society forms an important connecting link between the graduates in the field and the School of Mines.

The Minnesota Section of the American Institute of Electrical Engineers meets monthly in St. Paul and Minneapolis alternately. Students of the College of Engineering are wlecome at these meetings.

The Grange is comprised of the members of the faculty of the Department of Agriculture and others connected with the institution and interested in its welfare. Meetings are held on the first and third Monday evenings of each month. The order is intended to bring those connected with the College and Station in closer touch with one another and with the many lines of work carried on in the several divisions. Its further purpose is to keep in closer touch with the scientific world and the grange work of the state and nation.

The Philomethian Literary Society is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating, and parliamentary practice. The society meets once a week and presents a program including readings, recitations, debates, etc. The membership is limited to forty and is only for students in the College of Agriculture.

The Forestry Club was organized by the Forestry students for the promotion of good fellowship and mutual interests. The specific object of the club is to keep the members up to date on Forestry Literature and current affairs in the lumber world.

The Northwestern Branch of the American Pharmaceutical Association meets six times a year at the College or elsewhere in the Twin Cities. Pharmacy students are always welcome at these meetings and are eligible to membership in the Branch.

PUBLICATIONS

The Minnesota Daily is published five times each week during the University year by an organization of University students.

The Junior Annual, called "The Gopher" is a book published annually by the junior class of the University.

The Minnesota Magazine is a monthly magazine devoted to the cultivation of literary taste and effort among the students of the University. It is managed by a board of editors chosen from the senior class.

The Minne-Ha-Ha is a humorous monthly magazine, published by the students of the University. It depicts life upon the campus in a satirical vein. The board of editors consists of ten members, chosen from the student body.

The Minnesota Alumni Weekly is published every Monday during the University year. The Weekly is published entirely in the interest of the alumni and is devoted to alumni news and such University news as may be of special interest to the alumni.

The Year-Book of the Society of Engineers is published annually It is devoted to the publication of articles upon engineering subjects by professors and students.

The Minnesota Forester is the official organ of the Minnesota State Forestry Association. It is edited by the Forestry Department of the University and is devoted to the advancement of the Forestry movement with special emphasis on farm forestry.

The School of Mines Bulletin is published annually in April. It is devoted entirely to information concerning the alumni of the School of Mines. A complete record of each alumnus is published from the time of graduation to the time of publication of the Bulletin. The School of Mines Society issues this publication and sends it to every alumnus of the School.

The Minnesota Farm Review is a paper published and managed by the Alumni Association of the School of Agriculture. It is the official organ of the Alumni Association and the Farmers' Club. The Review is intended to be a medium through which former students may keep in touch with the Agricultural School and with one another. It also endeavors to bring the farmers of the State into closer touch with the School, the College and the Experiment Station. To this end, the paper strives to present the latest progress in the experimental work of the various Stations and to call attention to the most practical farm practices

WOMEN STUDENTS

After June first, 1909, the Registrar will supply a list of recommended boarding and rooming places to any women requesting such information. Young women who wish to earn a part of their expenses may generally learn of opportunities by communicating with Miss Ada Comstock, Dean of Women. During the college year Miss Comstock holds office hours every week day in the council room in Alice Shevlin Hall. At such times she welcomes any woman student who cares to come to her whether for advice, information, or an informal talk.

During the summer Miss Comstock's address is Moorhead, Minnesota. She will be glad to correspond with young women who are planning to enter the University or with their parents.

Shevlin Hall.—Through the generosity of Hon. Thomas H. Shevlin, the University now possesses in Alice Shevlin Hall a building admirably designed and equipped for the use of its women students. It is a two-story and basement structure, the material used being pressed brick with stone trimmings. It has a frontage of one hundred and fourteen feet on Pillsbury avenue and a depth of fifty-five feet. The purpose of this building is to furnish suitable rest and study rooms for the women attending the University. The building contains several society rooms, a large lunch room, and a general reception hall.

THE STUDENT GOVERNMENT ASSOCIATION FOR WOMEN.—This organization was formed for the purpose of aiding in the care and conduct of Alice Shevlin Hall. Every women student in the University is regarded as a member. There are no dues. The association makes rules for the guidance of those using Alice Shevlin Hall; it provides committees to enforce the rules; it gives permission for the holding of social functions in the building; and it controls the expenditure of any surplus in the receipts from the lunch room.

THE WOMEN'S LEAGUE.—This organization is open to all women who are students in the University. It is governed by a council made up of student members from the four college classes. It makes its headquarters in the council room in Alice Shevlin Hall. The aim of the organization is to promote good fellowship and sociability among the women of the University. For this purpose it gives receptions and parties for girls at regular intervals throughout the year. It also endeavors to aid in any project which may be of benefit to the University, and particularly to the women students. At present it is interested in the effort to secure dormitories.

VI

ADMISSION

Admission

Admission to the colleges or schools of the University is either by certificate or by examination. The candidate must offer fifteen year credits of high school work so chosen as to include those subjects required by the college or school which he wishes to enter. Of these fifteen year credits prescribed for admission the six in list A are required for admission to the freshman class in all the colleges and schools of the University except the College of Pharmacy, and no substitutions are accepted.

Certain of the nine additional credits to be selected from list B are prescribed by individual colleges, as indicated under requirements of individual colleges.

The term CREDIT means not less than five recitations of forty minutes each per week for a period of thirty-six weeks. In manual subjects and kindred courses a credit means the equivalent of ten recitation periods per week for thirty-six weeks.

LIST A

English	four credits
Elementary Algebra	one credit
Plane Geometry	one credit

LIST B

MATHEMATICS
- Higher algebra, one half credit
- Solid geometry, one half credit

LATIN
- Grammar, one credit
- Caesar, four books, one credit
- Cicero, six orations, one credit
- Virgil, six books, one credit

GREEK
- Grammar, one credit
- Anabasis, four books, one credit

GERMAN
- Grammar, one credit
- Literature, one credit

FRENCH
- Grammar, one credit
- Literature, one credit

SPANISH
  Grammar, one credit
  Literature, one credit

NORWEGIAN-SWEDISH
  Grammar, one credit
  Literature. one credit

HISTORY
  Ancient to Charlemagne, one credit
  Modern, from Charlemagne, one credit
  English, one half credit
  Senior American, one half credit

AMERICAN GOVERNMENT, one half credit
PHYSICS, one credit
CHEMISTRY, one credit
BOTANY, one half or one credit
ZOOLOGY, one half or one credit
ASTRONOMY, one half credit
GEOLOGY, one half credit
PHYSIOGRAPHY, one half credit
COMMERCIAL GEOGRAPHY, one half or one credit
BUSINESS SUBJECTS, accepted only as parts of a well defined course
  History of commerce, one half credit
  Economic History of England, one half credit
  Economic History of the United States, one half credit
  Elementary economics, one half credit
  Business law, one half credit
  Elementary bookkeeping, one half credit
  Advanced bookkeeping and business practice, one credit
  Stenography and typewriting, two credits
  Business spelling and correspondence, one half credit

MANUAL SUBJECTS, accepted only as parts of a well defined course
  Freehand drawing, two credits
  Mechanical drawing, two credits
  Shop work, two credits
  Modeling and wood carving, one credit
  Domestic art and science, two credits

REQUIREMENTS OF INDIVIDUAL COLLEGES

College of Science, Literature, and the Arts

List A	6 credits
List B, elective	9 credits

Entrance examination in English is required of all candidates for admission to the freshman class.

All who do not present credits for both higher algebra and solid geometry are required to take mathematics five times per week through the freshman year.

Graduates of accredited schools shall present all entrance grades marked; "passed," "passed with credit," or "passed with honor," and each subject marked "passed" shall count as an entrance condition unless a State High School Board certificate be presented for each subject so marked. For further detailed information see bulletin of the college.

College of Engineering and the Mechanic Arts

List A	6 credits
List B	
Chemistry	1 credit
Higher Algebra	½ credit
Solid Geometry	½ credit
Language	2 credits
*Elective	5 credits

Entrance examinations in elementary and higher algebra, plane and solid geometry are required of all except those who present Minnesota High School Board certificates for these subjects.

*Business subjects will not be accepted, and of the manual subjects only mechanical drawing and shop work may be counted towards admission.

College of Agriculture

For high school graduates,

List A	6 credits
List B	9 credits

For graduates of the School of Agriculture see bulletin of the College of Agriculture.

School of Agriculture

See bulletin of the School of Agriculture.

College of Law

List A	6 credits
List B	9 credits

In addition students must present credits showing the completion of one full year of collegiate work in Arts and Science.

College of Medicine and Surgery

1. For Candidates for the Degrees B. S. & M. D.

List A	6 credits
List B.	
Latin	2 credits

Higher Algebra	½ credit
Solid Geometry	½ credit
Elective	6 credits

In addition two years of prescribed college work in science, literature and the arts, comprising the following named subjects:

Second part Higher Algebra	one semester
Trigonometry	one semester
General Inorganic Chemistry	one year
Qualitative Analysis	one year
General Zoology	one year
Comparative Anatomy of Vertebrates	one year
General Botany	one year
Elements of Economics	one semester
Economic Conditions in American Cities	one semester
Rhetoric	one year
Physics	one year
Military Drill	two years
Physical Culture	one year
*German	two years
or German and French	two years

*Students who enter without German are required to take two years of German.

Students who enter with two years of German must take one year of German, and may elect German or French for the other year.

2. For Candidates for the Degree M. D.

List A	6 credits

List B.

Latin	2 credits
Elective	7 credits

Two years of regular college work in science, literature and the arts including specifically the following subjects:

Biology (Zoology or Botany)	one year
General Inorganic Chemistry	one year
Qualitative Analysis	one year
Language (German or French)	one year
Physics	one year

College of Homeopathic Medicine and Surgery

Same as for Medicine and Surgery above.

College of Dentistry

List A	6 credits
List B.	
Latin	1 credit
Manual Training	1 credits
Elective	7 credits

College of Pharmacy

English	2 credit
Elementary Algebra	1 credit
Plane Geometry	1 credit
Physics	1 credit
Latin	2 credits

Elective, (see bulletin College of Pharmacy)

School of Mines

List A	6 credits
List B.	
Higher Algebra	½ credit
Solid Geometry	½ credit
Elective	8 credits

Entrance examinations in elementary and higher algebra, plane and solid geometry are required of all candidates for admission.

School of Analytical and Applied Chemistry

List A	6 credits
List B.	
Higher Algebra	½ credit
Solid Geometry	½ credit
Chemistry	1 credit
Elective	7 credits

Every applicant for admission to the Applied Course must either present State High School Board certificates for the mathematical subjects required for admission, or take the entrance examinations in said subjects at the University.

College of Education

List A	6 credits
List B	9 credits

In addition two years of collegiate work in any college or university of recognized standing are required.

Graduate School

See bulletin of that school.

ADMISSION BY CERTIFICATE

Graduates of the following courses, provided their preparation satisfies the specific requirements of the college they desire to enter, will be admitted to the freshman class without conditions, except where entrance examinations are required.

(a) Any four-year course of a Minnesota State High School or other accredited school in the state.

(b) A four-year course of schools in any other state accredited to the State University of that state.

(c) The advanced Latin or English course of the Minnesota state normal schools.

A candidate wishing to enter the University from an accredited school should furnish the registrar an official statement of his preparatory work certified to by the principal of the school from which he comes. Blank certificates for admission for school year 1909-1910 may be secured from the registrar, and should be filled out and returned to him for approval before August 1st, 1909. An applicant will be admitted conditionally who is deficient in not more than three half year credits (one year credit in the College of Engineering), and such entrance conditions must be removed before the beginning of the sophomore year; provided, that no student entering the College of Engineering or the School of Mines may be conditioned in Mathematics except upon special permission of the department of Mathematics.

ADMISSION BY EXAMINATION

For program of entrance examinations see page 3.

Whenever admission is by examination, the candidate must pass examinations in the credits specifically, required for entrance to the college in question, and in addition sufficient credits from the group of electives in list B, to make a total of fifteen year credits; provided that, if the total deficiency does not exceed three half year credits (in the College of Engineering one year credit), the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions. Provided that no student entering the College of Engineering or the School of Mines may be conditioned in mathematics except upon special permission of the department of mathematics.

LIST OF ACCREDITED SCHOOLS

Graduates of the following Minnesota State High Schools will be admitted to the University of Minnesota without conditions, provided that their credentials satisfy the specific requirements of the college to which entrance is desired.

Ada
Adrian
Aitkin
Albert Lea
Akeley
Alden
Alexandria
Amboy
Annandale
Anoka
Appleton
Argyle
Arlington
Atwater
Austin
Bagley
Barnesville
Belle Plaine
Bemidji
Benson
Bird Island
Biwabik
Blooming Prairie
Blue Earth
Brainerd
Breckenridge
Browns Valley
Buffalo
Caledonia
Cambridge
Canby
Cannon Falls
Cass Lake
Chaska
Chatfield
Chisholm
Clarkfield
Cloquet
Cokato
Cottonwood
Crookston
Dawson
Delano
Detroit
Dodge Center
Duluth
  Central
  Industrial
Eagle Bend
E. Grand Forks
Elbow Lake
Elgin
Elk River
Elmore
Ely
Eveleth
Excelsior
Fairfax
Fairmount
Faribault
Farmington
Fergus Falls
Fertile
Fosston
Frazee
Fulda
Gaylord
Glencoe
Glenwood
Graceville
Grand Meadow
Grand Rapids
Granite Falls
Hallock
Halstad
Harmony
Hastings
Hawley
Hector
Henderson
Herman
Heron Lake
Hibbing
Hinckley
Hopkins
Houston
Howard Lake
Hutchinson
Jackson
Janesville
Jordan
Kasota
Kasson
Kenyon
Kerkhoven
Lake Benton
Lake City
Lake Crystal
Lakefield
Lake Park
Lamberton
Lanesboro
Le Roy
Le Sueur
Le Sueur Center
Litchfield
Little Falls
Long Prairie
Luverne
Lyle
McIntosh
Mabel
Madelia
Madison
Mankato
Mantorville
Mapleton
Marshall
Mazeppa
Milaca
Minneapolis
  Central
  East
  North
  South
  West
Minneota
Montevideo
Montgomery
Monticello
Moorhead
Mora
Morris
Morton
Mountain Lake
New Prague
New Richland
New Ulm
Northfield
North St. Paul
Olivia
Ortonville
Osakis
Owatonna
Park Rapids
Paynesville
Pelican Rapids
Perham
Pine City
Pine Island
Pipestone
Plainview
Preston
Princeton
Red Lake Falls
Red Wing

Redwood Falls
Renville
Rochester
Royalton
Rush City
Rushford
St. Charles
St. Cloud
St. James
St. Louis Park
St. Paul
  Central
  Cleveland
  Humboldt
  Mechanic Arts
St. Peter
Sandstone
Sauk Center
Sauk Rapids
Shakopee
Sherburn
Slayton
Sleepy Eye
South St. Paul
Springfield
Spring Grove
Spring Valley
Staples
Stephen
Stewartville
Stillwater
Thief River Falls
Tracy
Two Harbors
Tyler
Virginia
Wabasha
Wadena
Warren
Waseca
Waterville
Welcome
Wells
West Concord
Wheaton
White Bear
Willmar
Willow River
Windom
Winnebago
Winona
Winthrop
Worthington
Zumbrota

Graduates of the following private schools will be admitted to the freshman class under same conditions governing admission of high school graduates, provided, that the regular four-year course taken satisfies the specific requirements of the college to which entrance is desired and provided also, that the student be recommended by the principal of the school for admission to the University:

St. Mary's Hall, Faribault
St. Paul Academy
Shattuck Military Academy,
  Faribault

Stanley Hall, Minneapolis
Windom Institute, Montevideo

Concordia College, Moorhead
Pillsbury Academy, Owatonna
St. Joseph's Academy, St. Paul
St. Paul's College, St. Paul Park
The Loomis School, St. Paul
The Backus School for Girls,
  St. Paul
The College of St. Catherine,
  St. Paul
St. Margaret's Academy,
  Minneapolis
The Winona Seminary, Winona
St. John's College, Collegeville
St. Thomas College

ADMISSION AS UNCLASSED STUDENTS

Whenever in the judgment of the enrollment committee an applicant presents satisfactory reasons for not taking the regular course, such applicant may be admitted as an unclassed student. He must take the same examinations or present the same credentials as are required of those who enter the freshman class. Exceptions can be made only upon vote of the faculty. A new application must be made each semester to the enrollment committee. Provided, that no unclassed student shall be admitted to the School of Mines.

ADMISSION TO STUDY MUSIC

Students who enter the University for the express purpose of studying music, must take the same examinations or present the same credits that are required of those who apply for admission to the freshman class. No student is admitted for the purpose of studying music, unless he presents a certificate from the department of music showing that he is qualified to pursue the courses offered.

ADMISSION TO ADVANCED STANDING

1. FROM OTHER COLLEGES

This University accepts records from all reputable colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in the college to which admission is sought, subject to the approval of the departments concerned. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show:

(a) The subject studied; if a language, the books read, etc.
(b) The time spent upon each subject
(c) Ground covered in laboratory work, in case of laboratory subjects
(d) The result. It is sufficient to state that the subject was completed creditably.

Records from institutions whose entrance requirements are not as high as those of this University will not be accepted for equivalent rank. The credits to be allowed in such cases will be determined by the Enrollment Committee of the college in question.

2. FROM MINNESOTA NORMAL SCHOOLS

Graduates of the "advanced graduate course" of a Minnesota State Normal School are admitted to the College of Science, Literature, and the Arts (see bulletin of College of Science, Literature, and the Arts) with advanced standing equivalent to one year's credit.

Individual graduates of the "Advanced Latin course" (five year) or of the "Advanced English course" (five year) of a Minnesota State Normal School, who on the basis of maturity and ability, present certificates of special fitness from the president of the Normal School, will be admitted with advanced standing under the same regulation and proviso.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

English (four years)

In order to secure a definite plan of study and unity of method on the part of preparatory schools, the entrance requirement in English is outlined below somewhat in detail. To satisfy this requirement a four-year course of not less than four hours per week must be pursued. The headings under which instruction will naturally fall are:

(a) English Classics
(b) The Principles of Rhetoric
(c) Practice in Written Expression

(a) English Classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth*; Milton's *Paradise Lost*; Carlyle's essay on *Burns*. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

(b) The work in the principles of composition should include the principles and technical terms of ordinary texts upon the subject, whether acquired by the direct study of such texts or mainly by the study of selected English masterpieces. It should not be forgotten that this is not an end in itself, but simply a means of teaching the student the correct use of English.

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

Elementary Algebra (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

Higher Algebra, First Part (one-half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be rigorously demonstrated, the exercises and problems should be more difficult, and students should be drilled in short methods and rapid work. Unless candidates have a good knowledge of the fundamental topics named below, they are not prepared to pursue successfully at the University the second part of higher algebra.

The topics are addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, theory of exponents, involution, evolution, surds, imaginaries and simple equations with problems.

PLANE GEOMETRY (one year). Any of the standard texts on this subject will furnish the necessary preparation. Isoperimetry, symmetry and maxima and minima of figures are not required. The exercises requiring solutions and demonstrations should not be omitted.

SOLID GEOMETRY (one-half year). Any of the standard texts on this subject will furnish the necessary preparation. The exercises requiring solutions and demonstrations should not be omitted.

LATIN GRAMMAR (one year). This will include the subjects of orthography, etymology and syntax. Proficiency is particularly desired in the following subjects: the analysis of the verb forms, the rules of syntax, and the principal parts of the irregular verbs.

CAESAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text, more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

CICERO (one year). Any six orations from the following list. AGAINST CATILINE, POET ARCHIAS, LIGARIUS, MARCELLUS, MANILIAN LAW (to count as two orations), the fourteenth PHILLIPIC. The student should also be familiar with the life of Cicero.

VIRGIL (one year). Six books of the AENEID, or five of the AENEID and one of the METAMORPHOSES of Ovid, or the ECLOGUES. The student should be familiar with the life of Virgil and an account of his times and writings. A correct rythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

(1) A correct pronunciation, training of the ear, eye and organs of speech.

(2) A vocabulary of a thousand words of every day use; facility in combining these words into simple sentences. As a means to this, 100 to 150 pages of easy narrative prose and poetry should be read, from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.

(3) From two to three hundred German idioms.

(4) The essentials of German grammar, to be taught by means of oral and written exercises based upon the reading lessons.

Second year:

(1) Read one hundred and fifty to two hundred pages of prose and poetry.

(2) Practice in reading smoothly and with expression.

(3) Carefully translate selected passages of the text into idiomatic English. To translate easy sentences which the student already understands is a waste of time.

(4) Translate sentences from English into German, using words and idioms of the text read.

(5) Study topically German grammar; chief rules of orthography, etymology and syntax; illustrate these by words, phrases and sentences selected or composed by the student.

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

Norwegian (two years). First year, grammar and reader; one of Bjornson's stories. Second year, grammar reviewed; Raabe's History of Norway and a modern story or some easy play; composition and conversation.

Swedish (two years). First year, the essentials of Swedish grammar; reading of easy prose and verse. Second year, grammar reviewed and composition; works of Tegner and Runeberg; elementary history of literature.

Ancient History (one year)

(a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Euphrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterward to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

Modern History (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intellectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

English History (one-half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

Senior American History (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1882 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

American Government (one-half year.) This should be a study of our government, national, state and local, as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the Constitution of the United States, the constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

PHYSICS (one year). It is suggested that the year's work be confined to four of the seven subjects mentioned below.

(1) Mechanics of solids, (2) liquids and gases, (3) sound, (4) heat, (5) light, (6) and (7) electricity and magnetism (to count as two subjects, but not to be divided).

CHEMISTRY (one year). The full year's work should include a study of both the non-metals and metals with laboratory experiments illustrating the common chemical laws and the commoner chemical reactions.

BOTANY (one or one-half year). Schools which give one-half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxonomy should be the aim of the course.

ZOOLOGY (one or one-half year. The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc. —in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out along the line indicated above.

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under the best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

ASTRONOMY (one-half year). An elementary course in general astronomy as presented in any good modern text-book.

GEOLOGY (one-half year). These subdivisions should receive special attention: physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals modifying the earth; and a brief survey of historical geology.

PHYSIOGRAPHY (one-half year). The following topics should be emphasized: meteorology, the leading facts relating to the atmosphere and its phenomena, including some acquaintance with the work of the United States weather bureau; land sculpture, as it treats of the origin, development and decadence of land forms, and the influence of these processes on the physical environment of man.

COMMERCIAL GEOGRAPHY (one-half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemented by map work and assigned readings.

BUSINESS SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A BUSINESS COURSE

. The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to certain colleges of the University on the same footing as the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The other sixty per cent should embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: first, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business law; second, courses dealing with the technique of business. The latter may be further subdivided into the mathematics of business, including business arithmetic, bookkeeping and business practice; and the language of business, including stenography, typewriting and business correspondence.

HISTORY OF COMMERCE (one-half or one year). The history of commerce forms the natural introduction to the study of present economic conditions. It would be well to give special attention to the economic history of England and the United States. The work should be based on a text book, supplemented by carefully directed map work and assigned readings. This should be preceded by a year course of medieval and modern European history.

ECONOMIC HISTORY OF THE UNITED STATES (one-half year). A study of American history with special attention to the economic factor. It should be based on some text book such as Wright, Coman or Nogart and supplemented by collateral reading, especially in books such as Semple and Brigham on geographic influences.

This course will naturally follow the one on English history and may take the place of the usual political American history.

ECONOMIC HISTORY OF ENGLAND (one-half year). A study of English history with special reference to causes and effects of her economic development. It should be based on some of the smaller economic histories such as Cheyney, Price or Cunningham and McArthur.

This course, where given, will naturally follow the courses in general European history, and may take the place of the usual political English history.

ELEMENTARY ECONOMICS (one-half year). In the study of economics it is desirable to avoid two extremes, abstract theory on the one hand, and controversial questions such as the tariff, trusts, and trade unions on the other hand. Emphasis should be placed on historical and descriptive matter, especially relating to the economic development of England and the United States. Some good elementary text book should be mastered and a reasonable amount of collateral reading required.

Business Law (one-half year). The object of this study is not to make "every man his own lawyer" but rather to enable him to keep out of legal complications. Text book supplemented by study of a few typical cases, and practice in drawing up ordinary legal papers such as bills, notes, checks, etc.

Business Arithmetic (one-half year). The object is first of all, absolute accuracy and secondly speed in ordinary business computations. The topics to be emphasized are fundamental operations, common fractions having as denominator 2, 3, 4, 6 and 8, a few common weights and measures, percentage and its applications, and useful short methods, especially the use of interest and other calculation tables The work should be based on a text book, supplemented by numerous live exercises from current sources.

Elementary Bookkeeping (one year). A text book should be employed with exercises so arranged that no two pupils will do exactly the same work, and no credit should be allowed unless the work is done neatly, accurately and at a satisfactory rate of speed. It is suggested that double periods be provided, and all work be done in class under the eye of the instructor. The set used should include the journal, cash book, sales book, ledger, check book, bank pass book and trial balance book.

Advanced Bookkeeping and Business Practice (one year). Thorough drill on standard business forms, such as bills, receipts, checks, notes, etc., also on the use and meaning of business symbols and abbreviations. The student should become acquainted with the bill book and invoice book, and loose leaf and voucher systems of bookkeeping. Each student should carry on a business of his own, first as an individual, then as a partnership, and finally as a corporation. Credit on this course should mean that the student lacks only age and actual business experience to become a competent bookkeeper.

Stenography and Typewriting (two years). This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone. Nothing but the touch method should be used in typewriting. The essentials are first, accuracy and speed in taking dictation and transcribing notes; secondly, correct spelling, capitalization, punctuation and paragraphing. The minimum speed at the end of the first year should be 75 words per minute in dictation and 25 words per minute on the machine; and at the end of the second year, 100 words per minute in dictation and 35 words per minute in transcribing notes. Thorough training should also be given in care of the machine, in modern methods of manifolding and in filing papers.

Spelling and Business Correspondence (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to the most prominent industries of the locality.

MANUAL SUBJECTS

THESE ARE ACCEPTED FOR ADMISSION ONLY WHEN CONSTITUTING PARTS OF A MANUAL TRAINING COURSE

In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school, should offer all of the subjects indicated. Not to exceed twenty-five per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, business subjects, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

Owing to the fact that drawing and shop work do not require outside preparation, it is not fair that they should be credited by the schools on the same basis as the academic subjects. It is therefore suggested that half the credits be allowed: that is to say, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject.

FREEHAND DRAWING (two credits)
MECHANICAL DRAWING (two credits)
JOINERY (one-half credit)
WOOD TURNING AND CABINET MAKING (one-half credit)
PATTERN MAKING AND FORGE SHOP (one-half credit)
MACHINE SHOP, INCLUDING CHIPPING
FILING AND WORK ON THE IRON LATHE (one-half credit)
DRILL PRESS AND IRON PLANER
CLAY MODELLING (one-half credit)
WOOD CARVING (one-half credit)
DOMESTIC ART, INCLUDING CAREFULLY GRADED EXERCISES IN SEWING (one credit)
DOMESTIC SCIENCE, INCLUDING PRACTICAL COOKERY, AND HOUSEHOLD ECONOMY (one credit)

Degrees

The candidate for a degree must complete the requirements for graduation in his course. Any person may undergo, at suitable times, examination in any subject, and if such person pass in all the studies and exercises of the course, he is entitled to the appropriate degree; PROVIDED, however, that at least one full year (the one immediately preceeding the granting of the degree) must be spent at the University, before such degree shall be granted, and PROVIDED that examination, in every case, be held before a committee of the faculty appointed for that purpose.

For detailed information concerning requirements see the bulletins of the separate colleges and schools.

The degrees Bachelor of Arts, Bachelor of Arts in Education, Bachelor of Science, Master of Science, Master of Arts, Doctor of Philosophy, Civil Engineer, Mechanical Engineer, Electrical Engineer, Engineer of Mines, Metallurgical Engineer, Bachelor of Science in Chemistry, Bachelor of Science in Chemical Engineering, Bachelor of Science in Agriculture, Bachelor of Science in Forestry, Bachelor of Science in Home Economics, Doctor of Civil Law, Master of Laws, Bachelor of Laws, Doctor of Medicine, Doctor of Dental Surgery, and Bachelor of Pharmacy, are conferred, after recommendation by the deans of the respective colleges, by vote of the Regents.

THE UNIVERSITY STATE TEACHER'S CERTIFICATE

Graduates of the University may apply for and receive upon vote of the faculty, the University State Teacher's Certificate under the following conditions:

First: They must have maintained a good average of scholarship throughout the four years of college study.

Second: They must have the recommendation of at least one department concerned with high school studies.

Third: They must have completed one semester of Psychology and three semesters of Education, including courses 1 and 2.

This certificate by state law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of success, the certificate may be made permanent by the endorsement of the State Superintendent of Public Instruction and the President of the University.

VII

FEES AND EXPENSES

Expenses

All fees for incidental, laboratory or other charges are payabl at the beginning of each semester or term.

FEES

College of Science, Literature and the Arts

	Per ser
Incidental fee, resident	
Incidental fee, non-resident	
Animal Biology, courses 1 to 4, 8, 9, 15, each	
Botany, courses 1 to 16, each	
Chemistry 1, 2, 3, each	
Chemistry, 4	
Chemistry, 5	
Geology 10 and 11, each	
Mineralogy, 1 and 2	
Mineralogy, 3	
Music, 1, 2, 3 and 8, each	
Music, 4 and 5	32.00 to
Music, 6	
Physics, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 17, each	
Physics, 7, 11, and 16, each	

Drill suit, $15.00
Gymnasium suit, $2.00
Locker fees, $1.50
Deposit fee—military department, $5.00

College of Engineering

Incidental fee, resident	
Incidental fee, non-resident	

FRESHMAN YEAR

First semester	
Shop work	
Second semester	
Shop work	

SOPHOMORE YEAR

First semester	Per semester
Chemistry	5.00
Physics	3.00
Shop work	4.50
Biology or Botany	3.00
Second semester	
Same as for first semester.	

FOR CLASSES GRADUATING IN 1910-1911

JUNIOR YEAR

First semester	
Shop work	$4.50
Materials Testing Laboratory	6.00
Electrical Laboratory	1.50
Physics	3.00
Second semester	
Steam Laboratory	3.00
Hydraulic Laboratory	3.00
Experimental Laboratory	4.50
Electrical Laboratory	6.00
Electric Power	3.00

SENIOR YEAR

First semester	
Electrical Laboratory	$3.00
Fuel and Gas analysis	5.00
Electric Power	3.00
Experimental Laboratory	3.00 to 4.50
Second semester	
Electrical Laboratory	$4.50
Electric Power	3.00
Gas Engine Laboratory	6.00
Deposit fee—military department, freshman and sophomore years	5.00
Drill suit	15.00

College of Agriculture

Incidental fee, resident	$10.00
Incidental fee, non-resident	20.00

Laboratory fees same as under College of Science, Literature and the Arts.

College of Law

Matriculation fee	$10.00
Incidental fee (three terms) per term	20.00
Book deposit fee, per year	5.00

College of Medicine and Surgery

	Per semester
Incidental fee	$50.00
Microscope fee, 1st year, 1st sem	4.00
2nd year, 1st sem., $3.00, 2nd sem	4.00
3rd year, 1st semester	4.00
4th year, Clinical Microscopy	2.00
For elective courses	2.00

	Per year
Breakage fee deposit	$5.00
Hospital fee (Jr. and Sr. year)	3.00

College of Homeopathic Medicine and Surgery

Same as for College of Medicine and Surgery

College of Dentistry

	Per semester
Incidental fee	$75.00
	Per year
Breakage deposit	5.00

College of Pharmacy

TWO YEAR COURSE

	Per year
First year	$75.00
Second year	90.00
	$165.00

THREE YEAR COURSE

First year	$45.00
Second year	55.00
Third year	65.00
	$165.00

School of Mines

FRESHMAN YEAR

	Per year
Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00

	Per year
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
	$95.00

SOPHOMORE YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
	$54.00

JUNIOR YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Steam laboratory	3.00
Trip to the mines	$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
	$152.00 to 227.00

SENIOR YEAR

Incidental fee, resident	$30.00
Incidental fee, non-resident	60.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
	$93.00
Deposit fee	3.00

The School of Chemistry

	Per semester
Incidental fee, resident	$15.00
Incidental fee, non-resident	30.00
Shop	4.50
Assaying	15.00
Chemistry courses 1, 2, 3, 10, 14, 18, 19, 23	5.00
Chemistry courses 4, 5	7.00

	Per semester
Chemistry course 6	10.00
Chemistry courses 9, 11, 12, 13, 15, 16, 17, 20, 24	3.00

The College of Education

Incidental fee, resident	$10.00
Incidental fee, non-resident	20.00

Other fees same as for College of Science, Literature and the Arts.

The Graduate School

Incidental fee,	$10.00

Proportionate fees for less than full work.

A fee of 25 cents per day is charged for each day of delayed registration in each of the colleges except the graduate school.

LIVING EXPENSES

The University of Minnesota has no dormitory system, and all students are thrown upon their own responsibility in obtaining boarding and rooming places.

The expense of living at the University varies greatly according to individual habits and tastes. In general the scale of expense is below rather than above that of similar institutions in the middle west and is considerably lower than that of most institutions situated in the eastern states.

Several years ago a number of young men and women, at the request of University officials, kept careful account of their expenses for the University year. The result was that the expenses of the young men ranged from two hundred and seventeen to three hundred and ninety-seven dollars for the University year. The same students earned sums varying from two hundred and thirty-seven to two hundred and seventy-two dollars. The young women reported expenses varying from one hundred and fifty to three hundred and fifty-five dollars. These figures do not include fees and, as the cost of living has increased decidedly, probably twenty-five per cent should be added to these figures to make them safe.

The students upon whose statements these figures are based were representative students; they were not extravagant nor did they deny themselves unduly to get along. While students can live within the figures given above, they would not, owing to the increased cost of living, be able to live as comfortably nor to have as many privileges as these students had.

Meals can be had at prices ranging from three dollars per week to as high as the student can afford to pay. In private families board ranges from three to five dollars.

Furnished rooms vary in price from eight to twenty dollars per month. Two students rooming together would of course reduce this expense. It is sometimes possible for a student, rooming alone, to secure a good room at an expense but little higher than when two room together; but such chances are the exception and not the rule. New students will find that they will be more likely to secure comfortable rooms and suitable board if they will consult the general secretary of either the Young Men's or Young Women's Christian Association immediately upon arrival at the University, or if they will correspond with these officers before coming to the University.

The student who learns some trade before coming to the University has a great advantage over the student who has to earn his money by ordinary manual labor. Students have earned their whole expenses while attending the University and have made good records at the same time. Other students have done so much work that they have not been able to keep up their studies, and have thus missed the one thing for which they were attending the University.

If it is possible for the student to have a part of his expenses paid, he should not attempt to earn his way entirely by his own exertions. It is a comparatively easy thing for a young man to earn half his living while attending the University and yet do good work in his classes. Students who want work seldom fail to find it. In coming to the University, the student should bring enough money with him so that he can live comfortably for a few weeks until he can find something to do.

Students who desire advice and assistance in securing a position to help pay their expenses should confer with the Secretary of the Y. M. C. A. at the University.

A pamphlet has been published containing five papers (one by a young woman) relating actual experiences of students who have made their way through the University. Students who contemplate making their own way through college will find here stated some very interesting and encouraging facts. A copy will be sent free to any address upon application.

VIII

Departments of Instruction

A

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

The College of Science, Literature and the Arts

FACULTY OF INSTRUCTION

Cyrus Northrop, LL. D., President

John F. Downey, M. A., C. E., Dean, Professor of Mathematics, Head of Department of Mathematics

Ada Louise Comstock, M. A., Dean of Women, Professor of Rhetoric.

William W. Folwell, LL. D., Emeritus Professor of Political Science

Jabez Brooks, D. D., Emeritus Professor of Greek

John G. Moore, B. A., Professor of German, Head of Department of German.

Christopher W. Hall, M. A., Professor of Geology and Mineralogy, Head of Department of Geology

Charles William Benton, Litt. D., Professor of the French Language and Literature, Head of Department of Romance Languages

Maria L. Sanford, Emeritus Professor of Rhetoric

John Corrin Hutchinson, B. A., Professor of Greek, Head of Department of Greek.

John Sinclair Clark, B. A., Professor of Latin Language and Literature

Henry F. Nachtrieb, B. S., Professor of Animal Biology, Head of Department of Animal Biology

†**Frederick S. Jones**, M. A., Professor of Physics, Head of Department of Physics

George Bell Frankforter, Ph. D., Professor of Chemistry, Head of Department of Chemistry.

Willis Mason West, M. A., Professor of History, Head of Department of History

Francis P. Leavenworth, M. A., Professor of Astronomy, Head of Department of Astronomy

Frederick Klaeber, Ph. D., Professor of Comparative and English Philology, Head of Department of Comparative Philology

Joseph Brown Pike, M. A., Professor of Latin, Head of Department of Latin

Charles Peter Sigerfoos, Ph. D., Professor of Zoology

Richard Burton, Ph. D., Professor of English Literature, Head of Department of English

John Zeleny, Ph. D., Professor of Physics, Head of Department of Physics

Samuel G. Smith, Ph.D., LL.D., Professor of Sociology, Head of Department of Sociology and Anthropology

George Francis James, Ph.D., Professor of Education, Head of Department of Education

Norman Wilde, Ph.D., Professor of Philosophy and Psychology, Head of Department of Philosophy and Psychology

Carl Schlenker, B.A., Professor of German

Frank Maloy Anderson, M.A., Professor of History

Albert Ernest Jenks, Ph.D., Professor of Anthropology

William A. Schaper, Ph.D., Professor of Political Science

Charles Frederick Sidener, B.S., Professor of Chemistry

Edward Sigerfoos, Ph.B., LL.B., Capt. U.S.S., Professor of Military Science, Head of Department of Military Science and Tactics

Albert William Rankin, B.A., Professor of Education

George Neander Bauer, Ph.D., Professor of Mathematics

Frederic Edward Clements, Ph.D., Professor of Botany, Head of Department of Botany

John Henry Gray, Ph.D., Professor of Economics and Politics, Head of Department of Economics and Political Science

Frances Squire Potter, M.A., Professor of English

Edward Van Dyke Robinson, Ph.D., Professor of Economics and Politics

Albert Beebe White, Ph.D., Professor of History

Gisle Bothne, M.A., Professor of Scandinavian Languages and Literature, Head of Department of Scandinavian Languages

Andrew Adin Stomberg, M.A., Professor of Scandinavian Languages and Literature

Carlyle Scott, Professor of Music

William Stearns Davis, Ph.D., Professor of Ancient History

Joseph M. Thomas, M.A., Professor of Rhetoric, Head of Department of Rhetoric

John Evenson Granrud, Ph. D., Professor of Latin

Charles Albert Savage, Ph.D., Professor of Greek

Anthony Zeleny, Ph.D., Professor of Physics

Charles Martin Andrist, M.L., Professor of French

Fletcher Harper Swift, Ph.D., Professor of Education

Joseph W. Beach, Ph.D., Assistant Professor of English
John C. Brown, M.A., Assistant Professot of Animal Biology
Oscar Burkhard, M.A., Assistant Professor of German
William Henry Bussey, Ph.D., Assistant Professor of Mathematics
Louis Joseph Cooke, M.D., Director of Gymnasium.
Samuel N. Deinard, Ph.D., Assistant Professor of Semitic Language and Literature
Ira H. Derby, M.A., Assistant Professor of Chemistry
Hal Downey, M.A., Assistant Professor of Animal Biology
Henry Anton Erikson, B.E.E., Assistant Professor of Physics
Oscar W. Firkins, M.A., Assistant Professor of Rhetoric
Julius T. Frelin, B.A., Assistant Professor of French
Everhart P. Harding, M.A., Assistant Professor of Chemistry
Rowland Haynes, M.A., Assistant Professor of Psychology
Hans Juergensen, M.A., Assistant Professor of German
Edward M. Lehnerts, M.A., Assistant Professor of Geography
James Burt Miner, Ph.D., Assistant Professor of Psychology
Thomas Warner Mitchell, Ph.D., Assistant Professor of Business Administration
Edward E. Nicholson, M.A., Assistant Professor of Chemistry
Oscar W. Oestlund, Ph.D., Assistant Professor of Animal Biology
George Porter Paine, M.A., Assistant Professor of Mathematics
Mary Gray Peck, M.A., Assistant Professor of English
Frank M. Rarig, M.A., Assistant Professor of Rhetoric
†Benjamin M. Rastall, M.A., Assistant Professor of Economics
Samuel N. Reep, M.A., Assistant Professor of Sociology
Carl Otto Rosendahl, Ph.D., Assistant Professor of Botany
Frederick W. Sardeson, Ph.D., Assistant Professor of Paleontology
David Ferdinand Swenson, B.S., Assistant Professor of Philosophy
Josephine E. Tilden, M.S., Assistant Professor of Botany
Anthony L. Underhill, Ph.D., Assistant Professor of Mathematics
Matilda Jane Campbell Wilkin, M.L., Assistant Professor of German
Henry L. Williams, M.D., Director of Athletics
Jeremiah S. Young, Ph.D., and Ralph H. Hess, Ph.D., Assistant Professors, Extension Work in Economics and Political Science

Cephas Daniel Allin, M.A., LL.B., Instructor in Political Science
Emma Bertin, Instructor in French
Anna M. Butner, Director of Physical Culture for Women
Fredric K. Butters, B.A., Instructor in Botany
Henriette Clopath, Instructor in Drawing
Wilford O. Clure, B.A., LL. B., Instructor in Rhetoric

Lillian Cohen, M.A., Instructor in Chemistry
John L. Coulter, M.A., Instructor in Economics
Franics C. Frary, M.S., Instructor in Chemistry
William K. Foster, LL.B., Assistant Director of Gymnasium
Haldor B. Gislason, B.A., LL.B., Instructor in Rhetoric
Frank F. Grout, B.S., Instructor in Geology and Mineralogy
John A. Handy, Ph. C., Instructor in Chemistry
William F. Holman, Ph.D., Instructor in Physics
Ned L. Huff, M.A., Instructor in Botany
Leulah J. Judson, M.A., Instructor in History
Alois F. Kovarik, M.A., Instructor in Physics
†James E. Manchester, Sc.D., Instructor in Mathematics
James S. Mikesh, B. A., Instructor in Mathematics
Carl M. Melom, M.A., Instructor in Spanish and French
Charles W. Nichols, M.A., Instructor in Rhetoric
Wallace G. Notestein, Ph.D., Instructor in History
Raymond V. Phelan, Ph.D., Instructor in Economics
Anna H. Phelan, Ph.D., Instructor in Rhetoric
Bert A. Rose, Instructor of Band
Royal R. Shumway, B.A., Instructor in Mathematics
Nellie A. Whitney, B.L., Instructor in Rhetoric
Richard Wischkaemper, M.A., Instructor in German
Hurbert H. Woodrow, Ph. D., Instructor in Psychology
James Zimmerman, Instructor in Chemistry
Franz Aust, B.A., Assistant in Physics
Edward Anderson, B.S., in Chem., Assistant in Chemistry
Walter Badger, B.A., B.S., Assistant in Chemistry
Thomas Cahill, Assistant in Rhetoric
Charles R. Cressy, B.S., Assistant in Chemistry
James Davies, Ph. D., Assistant in German
Rene M. Delamare, Assistant in French
Rupert Eichholzer, M.A., Assistant in German
Helen Griffith, B.A., Assistant in Rhetoric
Daisy Hone M.A., Assistant in Botany
A. Alfred Johnston, B.A., Laboratory Assistant in Geology
Charles E. Johnson, M.A., Assistant in Animal Biology
Alfred E. Koenig, Assistant in German
Louis W. McKeehan, B.S. in Engr., Assistant in Physics
Jessie A. Matson, Assistant in Physical Culture
Leon Metzinger, B.A., Assistant in German
Alice M. Misz, M.A., Assistant in Botany
Peter Okkelberg, B.A., Assistant in Animal Biology
Elenor Sheldon, B.A., Assistant in English
Frieda L. Stamm, B.A., Assistant in German

Maude Steward, Assistant in Drawing
Edith von Kuster, Assistant in Chemistry
† Resigned

STUDENT HELPERS

For 1908-9

Edla Berger, B.A., Scholar in Mathematics
Keivin Burns, B.A., Scholar in Astronomy
Arthur R. Graves, Scholar in Economics and Political Science
Albert N. Gilbertson, B.A., Scholar in Sociology and Anthropology
Ingebright Lillihi, B.A., Scholar in Philosophy
Allison McManigal, B.A., LL.B., Scholar in Sociology and Anthropology
William W. Norton, Scholar in Philosophy
Alice Pope, B.A., Scholar in History
Charles Philips, Scholar in Animal Biology
Rasmus S. Saby, M.A., Scholar in Economics and Political Science
Dorothea Stewart, B.A., Scholar in Geology
Peter A. Sveeggan, B.A., Scholar in Rhetoric
Victor N. Valgren, B.A., Scholar in Economics and Political Science
Tosca von Schulten, Scholar in German
Annalee Weiskopf, B.A., Scholar in German

Faculty Committees

For 1909-10

Enrollment—HUTCHINSON, BAUER, SAVAGE, SWENSON, ZELENY, A.

Curriculum—MOORE, WEST, SIGERFOOS, RANKIN, ERIKSON, PIKE, ROBINSON.

Graduate Studies and Degrees—EDDY, GRAY, BROOKS, NACHTRIEB, SCHLENKER, GEROULD, HUTCHINSON (ex-officio).

Program—LEAVENWORTH, TILDEN, MINER

Students' Work—NICHOLSON, '09; WHITE, '10; COMSTOCK, '11; Wilde, '12; BUSSEY, '13

Relation of the University to the Public Schools—JAMES, BENTON, HALL, BOTHNE, ANDRIST

Public Lectures and University Functions—JENKS, POTTER, SIDENER, JUERGENSON, KLAEBER

Debate and Oratory—RARIG, SANFORD, WILLIS, SARDESON, SCHAPER

University Extension—JAMES, BURTON, FRANKFORTER, GRANRUD, ROSENDAHL, PECK

Catalogue—DOWNEY, ZELENY J., CLEMENTS, CLARK, ANDERSON STOMBERG, THE REGISTRAR

Admission

Every applicant for admission to this college must take an examination in writing, spelling, and English composition. (For details see page 105.)

Aside from this test, admission is either by certificate or by examination.

No student is admitted with more than three half-year conditions and all such conditions must be removed by examination within one year.

No student will be admitted to the work of the second semester unless he bring a certificate of advanced standing from another college showing his qualifications to continue the second semester's work. This is because all freshmen subjects begin in the fall and are continued throughout the year.

ADMISSION TO THE FRESHMAN CLASS BY CERTIFICATE

The following are admitted to the freshman class by certificate:

(a) Graduates of a four-year course of a Minnesota state high school, or other accredited school in Minnesota, provided:

1. That they have credits for four years of English and one year each of Algebra and Plane Geometry (all who do not present credits for both First Part Higher Algebra and Solid Geometry are required to take mathematics five times per week through the freshman year);
2. That they have nine additional year-credits for subjects selected from B below;
3. That they have records of "passed with credit" or "passed with honor" in all subjects presented.

This certificate privelege is further limited by the proviso that each school so accredited shall keep its records of standings in the following grades: "passed," "passed with credit," and "passed with honor, "or else shall show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these three grades.

The applicant for admission must present to the Registrar the principal's certificate containing his record on all the studies which were counted towards graduation.

All records shall be entered on this certificate as "passed," "passed with credit" or "passed with honor."*

Each mark below "passed with credit" shall count as a condition, unless a state high school board certificate shall be presented for the same subject.

Beginning in September, 1909, this rule for admission shall be applied to all work completed after June, 1908. Until it goes into effect for the full four years' work, applicants will be admitted provided they have not, on the average, more than one semester mark below "passed with credit" for each year subject to the rule.

(b) Graduates of a four-year course of a school in any other state which is accredited to the state university of that state.

(c) Graduates of the advanced Latin course of the Minnesota state normal schools.

*In per cent, these three grades are to be interpreted approximately as follows:

(1) In schools having 65 as a passing mark, passed = 65-75, passed with credit = 75-90, passed with honor = 90-100.

(2) In schools having 75 as a passing mark, passed = 75-80, passed with credit = 80-90, passed with honor = 90-100.

SUBJECTS ACCEPTED FOR ADMISSION

For list and description of subjects accepted for admission see pages 68 and 69 and 77 to 83.

2. ADMISSION TO THE FRESHMAN CLASS BY EXAMINATION

Students who enter by examination, besides the entrance examination in English must pass examinations in secondary school subjects as follows:

(1) The six year-credits under "A" above and

(2) Nine year-credits selected from the list of electives under "B," provided that, if the total of entrance conditions does not exceed three half-year credits, the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions.

The character of the preparation needed to pass the examinations is indicated in the descriptions of subjects above.

Entrance examinations are offered at the University during the opening week of the University year. The program for the year 1909-10 is printed in this bulletin on page 5. Certificates of Minnesota state high school board examinations will be accepted in place of University entrance examinations in whole or in part.

3. ADMISSION TO THE SIX-YEAR COURSE IN SCIENCE AND MEDICINE

The requirements are the same as under 1 and 2 above, except that the First Part Higher Algebra, Solid Geometry and two years of Latin are required.

4. ADMISSION TO THE TWO-YEAR COURSE WHICH PREPARES FOR THE COLLEGE OF MEDICINE AND SURGERY.

The requirements are the same as under 1 and 2 above, except that two years of Latin are required.

5. ADMISSION TO THE SOPHOMORE CLASS FROM MINNESOTA STATE NORMAL SCHOOLS

Graduates of the advanced graduate course of a Minnesota state normal school are admitted with advanced standing equivalent to one year's credit, and receive the degree of Bachelor of Arts upon completing in this college ninety-six credits including freshman mathematics, courses 3 and 4, provided the usual requirements regarding majors and minors on page 43 be complied with. Such students will not be permitted to elect education 5 or 7, mathematics 1 or 2, rhetoric 1, or history 1, and upon registering for mathematics 3 and 4 will be required to make good any deficiency in preparatory mathematics.

Individual graduates of the advanced Latin course (five years) or of the advanced English course (five years) of a Minnesota state normal school who, on the basis of maturity and ability, present certificates of special fitness from the president of the normal school, will be admitted with advanced standing under the same regulations and proviso.

6. ADMISSION TO ADVANCED STANDING

This college accepts records from all reputable colleges and universities for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this college. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show:

(a) The subject studied; if a language, the books read, etc.

(b) The time spent upon each subject.

(c) Ground covered in laboratory work in case of laboratory subjects.

(d) The result. The exact grades should be stated, accompanied with an explanation of the marking basis employed.

Candidates wishing to gain credits for advanced standing by examination are allowed examinations without additional charge, providing they be taken within six weeks after matriculating.

7. ADMISSION AS UNCLASSED STUDENTS

Whenever in the judgment of the enrollment committee an applicant presents satisfactory reasons for not taking the regular course, such applicant may be admitted as an unclassed student. He must take the same examinations or present the same credentials as are required of those who enter the freshman class. (See classes 1 and 2.) Exceptions can be made only upon vote of the faculty. A new application must be made each semester to the enrollment committee.

8. ADMISSION TO STUDY MUSIC

Students who enter the University for the express purpose of studying music must take the same examinations or present the same credits that are required by those who apply for admission to the freshman class (See classes 1 and 2.) No student is admitted for the purpose of studying music, unless he presents a certificate from the department of music showing that he is qualified to pursue the courses offered.

ENTRANCE EXAMINATION IN ENGLISH

All applicants for admission to the College of Science, Literature, and the Arts, except those belonging to classes 4 and 5 above, must be examined in writing, spelling, and English composition. The examination will be given in two parts.

Part I. Elementary.—Those who fail to pass this examination satisfactorily are required to take a special three-hour preparatory course in composition through their first year or longer if necessary. This work is not credited toward a degree. Students pursuing it are not allowed to take more than a maximum of seventeen hours of work per week, including this course. These students must take Rhetoric 1, but not until the preparatory work has been completed. At any time during the first half of the first semester the Department of Rhetoric may transfer promising students from the preparatory class to the class in Rhetoric 1.

Part II. Advanced.

Those who pass both parts of the examination with a grade of good or excellent take English 1 and 2, during their freshman year. Those who do not obtain one of these required grades register for Rhetoric 1.

The entrance examination will be given at the University in the chapel of the Library Building, Wednesday, Sept. 9, at 9:00 a. m.

The examination will be sent, upon application, to the principals of state high and other accredited schools in the state to be offered in each school at the option of the principal to members of the senior class who expect to enter the University. The examination, if given, must be held on Saturday, May 22, under the general rules which govern state high school board examinations. All papers must be sent immediately after examination to the Registrar of the University and will be marked by the proper University authority.

Students who enter the freshman class after the regular September examination without having taken the test in English may be given a special test if the Department of Rhetoric sees fit, or shall be registered for preparatory rhetoric with the provision that, if found proficient during the first six weeks, they may be promoted to the freshman rhetoric class. Such students must be prepared to suffer any furthur change in registration necessitated by the program and rules of the college.

Equipment

GROUNDS AND BUILDINGS

The buildings of the College of Science, Literature, and the Arts, along with those used by all departments of instruction save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University Avenue and the river and between Eleventh and Nineteenth Avenues Southeast. The campus is well wooded with a fine growth of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement.

Ten of the twenty-three buildings on the campus are used largely or exclusively for the work of the College of Science, Literature and the Arts. They include Folwell Hall, a building three hundred and twenty-two feet in length and three stories in height above the basement, in which offices, class and seminar rooms are provided for the mathematical, linguistic, philosophical and pedagogical departments; the Library Building, with provision for the social science and English departments; Pillsbury Hall for Animal Biology, Botany and Geology; Physics Building; the Chemistry Building; the Observatory; a plant house; the Armory, for military purposes and physical training; Shevlin Hall, devoted to the exclusive use of women students; and the Y. M. C. A. Building.

LIBRARIES

Besides the General Library, the College of Science, Literature and the Arts has the following department libraries: viz., those of Astromomy, Animal Biology, Botany, Chemistry, Economics and Politics, French, Geology, German, Greek, History, Latin, Mathematics, Military Science, Philology, Philosophy, Physics, Rhetoric, Scandinavian, and Spanish.

The departmental libraries are designed especially for the work of their respective departments and consist mainly of books of reference and current perodicals relating to technical subjects.

The whole number of bound volumes owned by the University is about one hundred and twenty thousand, unbound books and pamphlets about twenty thousand. About seven hundred and thirty current periodicals are received.

General Information

FEES

Incidental fee			
Residents of Minnesota,	$10.00	per	semester
Non-residents,	20.00	"	"
Laboratory fees			
Animal Biology, couress 1, 2, 3, 4, 8, 9 and 15, each	3.00	"	"
Botany, all undergraduate courses, each	3.00	"	"
Chemistry, all undergraduate courses, each	5.00	"	"
Except course 4,	7.00	"	"
and course 5,	10.00	"	"
Geology, course 11,	1.00	"	"
Mineralogy, courses 1 and 2, each	3.00	"	"
Course 3,	15.00	"	"
Music, courses 1, 2, 3 and 8, each	4.00	"	"
Courses 4 and 5 (1½ hours per week),	32.00	"	"
Courses 4 and 5 (3 hours per week),	64.00	"	"
Course 6,	2.00	"	"
Physics, courses 2, 4, 6, 7, 8, 9, 10, 12. 15 and 17, each	3.00	"	"
Course 5,	2.00	"	"
Courses 13 and 18, each	5.00	"	"
Change of registration,	2.00	per	subject
Delay in registration, beginning with first day of recitations (except for first registration),	.25	per day	
Examination for removal of condition, at set time,	1.00		
Special examination for removal of condition, at other than the set time,	5.00		
Examination on subject taken out of class,	5.00		
No fee for such examinations on first entering the University, if taken within the first six weeks.			

CLASS ROUTINE AND SCHOLASTIC REQUIREMENTS

Class work extends through six days of the week, except Saturday afternoon. The daily session is divided into eight class periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at eight thirty and closes at twelve thirty-five; the afternoon session extends from two o'clock until five forty. A general assembly of the faculty and students is held at ten thirty a. m.

Most of the courses of instruction are given in three periods per week. One series is scheduled for Monday, Wednesday, and Friday, another series for Tuesday, Thursday, and Saturday. Students are advised to try to arrange their programs so as to secure as even a distribution as possible between the two series, and also, if possible, in such a manner that they may have half of each day free for study at their rooms, some laboratory, or in the University library. This arrangement can usually be secured without restricting the choice of subjects by careful study of the program and bulletin.

Examinations are held at the close of each semester. Students are graded upon the basis of their class work and examinations for each subject which they pursue as excellent, good, passed, incomplete, conditioned, or failed. For graduation an average of good must be secured in at least fifty per cent of the courses pursued. In computing the averages an excellent balances a pass, making an average of good for each of the two courses. An incomplete must be removed within one month after the opening of the following semester or it becomes a condition. A condition can be removed by passing an examination in the subject before the opening of the corresponding semester of the following year; if not so removed, it becomes a failure and is subject to the rules governing failures. A failure must be pursued again in class.

A student who at any time becomes deficient in more than the work of one half year loses his class rank and is regarded as a member of the next lower class. Students whose absences exceed four weeks in the aggregate during a semester are not permitted to take the semester examinations without special permission of the faculty. Any student receiving conditions or failures in sixty per cent of the work of the first semester is dropped from the rolls and not allowed to re-enter the University until the opening of the following year.

MILITARY DRILL

The act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in military science and tactics at all institutions that are its beneficiaries. The armory is located on the University compus and has all the facilities usually provided in a modern armory. The United States government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

THE UNIVERSITY STATE TEACHER'S CERTIFICATE

Graduates of the College of Science, Literature, and the Arts may apply for and receive upon vote of the faculty the University state teacher's certificate under the following conditions:

First. They must have maintained a good average of scholarship throughout the four years of college study.

Second. They must have the recommendation of at least one department concerned with high school studies.

Third. They must have completed one semester of Psychology and three semesters of Education, including courses 1 and 2.

This certificate by state law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of success, the certificate may be made permanent by the endorsement of the State Superintendent of Public Instruction and the President of the University.

Courses of Study

I. FOUR-YEAR COURSE IN SCIENCE, LITERATURE AND THE ARTS, LEADING TO THE DEGREE OF BACHELOR OF ARTS

The degree of Bachelor of Arts will be conferred upon any student who fulfills the conditions as to amount, grade and distribution of work stated under A, B, and C below:

A. **Amount of work.**—The student must earn from the courses offered in the college one hundred and twenty-six credits, in addition to the required exercises in drill, gymnasium, and physical culture.

A credit is one hour per week through one semester.

Juniors and seniors pursuing beginning language courses (not including Spanish, Greek, and Hebrew), English 1 and 2, mathematics 1 and 2, chemistry 1 (a), rhetoric 1, or history 1, shall receive only half credits.

No student shall receive credit for more than two beginning modern language courses, save by special permission.

A double period in laboratory subjects counts as one credit hour.

B. **Grade.**—In at least one-half his work (sixty-three credits), the student must secure a grade of "good." For the system of grades see page 41. For the purpose of this count each "excellent" shall balance one "pass," making an average of "good" for both records.

C. **Distribution of work.**—

1. The student must complete a major and four minors. A major is not less than eighteen credits and a minor is not less than twelve credits in one department. Two minors, or a major and a minor, may be combined in one department, but at least one of the five subjects shall be chosen from each of the following groups:
   - (a) English, French, German, Greek, Latin, Rhetoric
   - (b) Animal biology, astronomy, botany, chemistry, geology and mineralogy, physics
   - (c) Economics and political science, history, mathematics, philosophy, sociology and anthropology.

   Majors are not offered in the Departments of Drawing, Music and Semitic.

In the statement of courses, departments may indicate any courses which shall not count toward a major or minor, and in no case shall the following courses be so counted: the first year of beginning languages (excepting Spanish, Greek, and Hebrew), English 1 and 2, mathematics 1 and 2, rhetoric 1, and history 1.

2. Each student must choose his major subject before the end of the sophomore year, and report to the Registrar his choice.
3. Upon the choice of his major subject, the department in which the student has made his selection shall assign him to an adviser in that department.
4. The student shall choose, under the advice and approval of his adviser, a sufficient amount of work to make with his major, a total of forty-eight credits, the additional subjects being such as to reinforce the major.

This rule applies for graduates of 1908-9 only to work in the junior and senior years, and for graduates of the year 1909-10 to work of the sophomore, junior, and senior years.

FRESHMAN YEAR

The subjects for which freshmen register must be continued through the year.

The amount of work must not be less than fifteen hours nor more than seventeen hours, exclusive of Military Drill and Gymnasium or Physical Culture.

REQUIRED

I.

English, three hours, for those who have passed part 2 of the entrance examination in English with a grade of good or excellent; or

Rhetoric, three hours, for those who have not so passed.

II.

Mathematics 1 and 2, five hours, for those who do not present entrance credits in both First Part Higher Algebra and Solid Geometry.

III.

Military Drill, three hours, and **Gymnasium**, one hour in two periods, for men; or

Physical Culture, three hours, for women.

ELECTIVE BY GROUPS

Each freshman must take at least one subject and not more than two subjects from each of the following groups; except that those who take mathematics 1 and 2, five hours, are not required, but are at liberty (if the maximum number of hours will permit), to take another subject from Group III.

I.

French 1, five hours; or French 3, three hours, with or without French 4 (conversation), two hours.

German 1, five hours; or German 4, three hours, with or without German 5 (conversation), two hours.

Latin 1, three hours.

Scandinavian 1, five hours, or 3, three hours; or Scandinavian 2, five hours, or 4, three hours.

II.

Animal Biology 1, three hours.

Botany 1, three hours.

Chemistry 1 or 2, three hours.

III.

Greek 1, five hours; or Greek 3, three hours.

History 1 or 2, three hours.

Mathematics 3 and 4, three hours each.

SOPHOMORE YEAR

REQUIRED

Military Drill, for men.

Not less than fifteen nor more than eighteen credit-hours of work from the following groups, selecting at least one from each group and not more than six credit hours from any one department.

Sophomores, so long as they conform to the above requirements, may elect courses in Comparative Philology, Scandinavian, Semitic, Drawing and any subjects of the freshman year which they have not already taken, except Rhetoric 1 by those who have taken English 1 and 2.

ELECTIVE BY GROUPS

I.

English, courses 1, 2, 3, 4, 5, 6, 7, 9.
French and Spanish, courses 2, 3, 4, 5, 6, 7, 8, 11, 12.
German, courses 2, 3a, 4, 5, 6, 7, 8.
Greek, courses 1, 2, 3, 4, 5, 13.
Latin, courses 3, 4, 5.
Rhetoric and Public Speaking, courses 2, 10.

II.

Animal Biology, courses 2, 3, 4, 5, 7, 8, 9, 15, 16.
Botany, courses 2, 3, 14, 15.
Chemistry, course 3.
Mineralogy, courses 1, 2, 3.
Physics, courses 1, 2, 3, 4, 5, 6.

III.

Economics, courses 1, 2, 3a, 3b, 4, 5a, 6, **Political Science**, course 1.
History, courses 1, 2, 3, 4, 5.
Mathematics, courses 6, 7.
Philosophy and Psychology, courses 1, 2, 3.

JUNIOR AND SENIOR YEARS

The work of these two years is elective, subject to the restrictions imposed by the requirement for a major course and four minor courses (see page 43), and the regulation that certain courses of the two preceding years count, when taken by juniors and seniors, for only half credit.

The number of credit-hours in any semester must be not less than fifteen nor more than eighteen, except by permission of the Committee on Students' Work.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS WITH DISTINCTION

Students may receive the degree of Bachelor of Arts with distinction in accordance with the following plan:

1. The degree with distinction shall be granted upon the basis of special excellence in the major subject, and shall be granted in only one department,.

2. To become a candidate for the degree of B. A. with distinction, the student must signify his intention by registration, upon the proper

blank, at some time between the close of the freshman year and the beginning of the senior year. Students wishing to become candidates for the degree are advised to register as such as early in the course as possible

3. At the time of registration for such degree the applicant must have an average of *good* in all his previous work. (For the purpose of this count, each excellent shall balance one *pass*, making an average of *good* for both records).

4. To receive the degree with distinction at graduation, the student must fulfill the following requirements:

a. Comply with all the regulations applying to the ordinary degree of Bachelor of Arts.

b. Secure a record at graduation, higher than pass in four-fifths of all his work (provided that an excellent shall balance a pass as in B, page 43.)

c. By May 1st of his senior year, present a satisfactory thesis upon a subject approved by the adviser in charge of this work.

d. Comply with the special requirements of the department in which he takes his major work.

e. Be recommended by the department to the faculty for special excellence in his work; and

f. Be approved by vote of the faculty.

5. A student registered for the degree with distinction may withdraw his name at any time from such registration, or the registration may be cancelled by the department concerned, or by the Dean after consultation with the department; but students whose registration for the degree with distinction has been withdrawn or cancelled shall still receive the degree of Bachelor of Arts upon completion of the requirements therefor.

6. The degree shall be given in the diploma thus: Bachelor of Arts, with distinction.

7. The names of students recommended by the faculty for the degree with distinction shall appear in the commencement program, with the statement that distinction has been acquired in a certain department. A certificate signed by the head of the department and the Registrar shall be presented to the student who has attained the degree with distinction.

8. The special requirements of the departments in which distinction may be gained shall be authorized by the faculty, after recommendation by the Curriculum Committee.

COMBINATION COURSES

For the benefit of those who wish to begin a professional course before completing the four-year course in Science, Literature and the Arts, the following combination courses and short courses are offered.

2. SEVEN-YEAR COURSE IN ARTS AND MEDICINE, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND DOCTOR OF MEDICINE

Seniors who intend to enter the College of Medicine and Surgery are permitted to take in that college anatomy, chemistry, histology and physiology (it being understood that no repetition of work is allowed,) and the work is credited as senior work, thirty-two credits, in the College of Science, Literature and the Arts and first-year work in the College of Medicine and Surgery. This privilege is conditioned upon their having credits for two years of Latin and for one year (three credit-hours per week) of each of the following: physics, general inorganic chemistry, qualitative analysis, zoology or botany, and German or French. They are required to complete a major and two minors, one in each of the groups (a), (b) and (c).

3. SIX-YEAR COURSE IN SCIENCE AND MEDICINE, LEADING TO THE DEGREES OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

For requirements for admission see page 28. The first two years of this course are given in the College of Science, Literature and the Arts, and the last four years are given in the College of Medicine and Surgery. It leads to the degree of Bachelor of Science at the end of four years, and to the degree of Doctor of Medicine at the end of six years.

Students who enter without French or German are required to take German 1, ten credits, and German 3 (scientific), six credits.

Students entering with two years of German may take French 1, ten credits, in either first or second year, and German 3, six credits, in the other year.

Descriptions of the following courses, which are all required, are given in the respective departmental statements.

FIRST YEAR

ZOOLOGY, course 1, three hours.
BOTANY, course 1, three hours.
CHEMISTRY, course 1 or course 2, three hours.
GERMAN OR FRENCH (see note above).
SECOND PART HIGHER ALGEBRA AND TRIGONOMETRY, three hours.
MILITARY DRILL AND GYMNASIUM, for men; PHYSICAL CULTURE, for women.

SECOND YEAR

COMPARATIVE ANATOMY OF VERTEBRATES, three hours.
QUALITATIVE ANALYSIS, three hours.
ELEMENTS OF ECONOMICS, three hours, first semester.
ECONOMIC CONDITIONS IN AMERICAN CITIES, three hours, second semester.
GERMAN OR FRENCH (see note above).
PHYSICS WITH LABORATORY PRACTICE, four hours.
RHETORIC, course 1, three hours.
MILITARY DRILL, for men.

The remaining years of the course are given in the College of Medicine and Surgery and the subjects may be found in the bulletin of that college.

4. TWO-YEAR COURSE FOR ADMISSION TO THE COLLEGE OF MEDICINE AND SURGERY

For admission to the College of Medicine and Surgery an entrance credit in two years of Latin and two years of work in the College of Science, Literature and the Arts are required. The subjects are the same as prescribed, under 1, for other freshmen and sophomores, but the following courses are required:

FIRST YEAR

MATHEMATICS, courses 1 and 2, or 3 and 4.
CHEMISTRY, course 1 or 2.
ANIMAL BIOLOGY, course 1, or BOTANY, course 1.
GERMAN OR FRENCH.

SECOND YEAR

PHYSICS, courses 1, 2, 3, 4.
CHEMISTRY, courses 3.

5. SIX-YEAR COURSE IN ARTS AND LAW, LEADING TO THE DEGREES OF BACHELOR OF ARTS AND BACHELOR OF LAWS

Seniors who intend to enter the College of Law are permitted to take in that college elements of contracts, domestic relations, commercial paper, torts and criminal law, and the work is credited as senior work, twelve credits, in the College of Science, Literature and the Arts and first-year work in the College of Law, thus enabling students, by some extra work, to finish the law course in two more years.

6. ONE-YEAR COURSE FOR ADMISSION TO THE COLLEGE OF LAW

For admission to the College of Law one year of work is required in the College of Science, Literature and the Arts. The subjects are the same as prescribed, under 1, for other freshmen.

7. COURSE FOR MUSIC STUDENTS

Students who have entered the University for the express purpose of studying music are required to register for courses 1 and 4 in music and at least six credits in other courses outside the Department of Music, preferably modern languages, to be selected with the approval of the Enrollment Committee.

8. UNCLASSED STUDENTS

Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions, four-fifths of the work during the first year must be taken from subjects offered to freshmen. A new application must be made each semester to the Enrollment Committee.

Any unclassed student who has satisfied the regular entrance requirements may classify at the beginning of either semester as a regular student, and become a candidate for the Bachelor of Arts degree by registering in accordance with the regulations governing amount and distribution of work as indicated on page 43.

RELATED DEPARTMENTS

The table below gives groups of related departments; but for convenience of reference the departments, in the departmental statements which follow, are arranged in alphebetical order.

I. ENGLISH LANGUAGE AND LITERATURE
  (a) English, (b) Comparative Philology, (c) Rhetoric
II. ANCIENT LANGUAGES AND LITERATURES
  (a) Greek, (b) Latin, (c) Semitic Languages
III. MODERN LANGUAGES AND LITERATURES
  (a) German, (b) Romance Languages, (1) French, (2) Spanish, (3) Italian, (c) Scandinavian Languages
IV. BIOLOGICAL SCIENCES

(a) Animal Biology, (b) Botany, (c) Paleontology

V. PHYSICAL SCIENCES

(a) Chemistry, (b) Geology and Mineralogy, (c) Physics

VI. PURE AND APPLIED MATHEMATICS

(a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics

VII. PHILOSOPHY, EDUCATION, AND ANTHROPOLOGY

(a)Philosophy and Psychology, (b) Education, (c) Anthropology

VIII. SOCIAL SCIENCES

(a) Economics and Political Science, (b) History, (c) Sociology and Anthropology

IX. FINE ARTS

(a) Drawing, (b) Music

X. MILITARY SCIENCE AND PHYSICAL CULTURE

Departmental Statements

ANIMAL BIOLOGY

Henry F. Nachtrieb, Professor, Head of Department of Animal Biology
Charles P. Sigerfoos, Professor
Oscar W. Oestlund, Assistant Professor
Hal Downey, Assistant Professor
John C. Brown, Assistant Professor
Charles E. Johnson, Assistant
Peter Okkelberg, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, eighteen credits, together with reinforcing subjects (thirty credits) selected from botany, geology, chemistry, physics, advanced modern language and additional animal biology.

For B.A., with distinction, the general requirements (page 46) and six credits in the department in addition to the requirements for a major.

For a Teacher's certificate, an average of at least good in courses 1 and 15 and 2 or 3 or 4 or 5 and twelve additional credits in the biological sciences, six of which must be in botany. Course 13 in zoology is recommended.

JOURNAL CLUB.

The Professors, instructors, and advanced students of the department meet once a week to review and discuss current zoological literature and to listen to reports from those carrying on investigations.

The laboratory fee for each of the courses 1, 2, 3, 4, 8, 9, 15 and 16 is three dollars per semester.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Zoology	1, 2	6	All	None
2.	Morphol. Invertebrates	1, 2	6*	Soph,. Jr., Sr.	1
3.	Histol.-Embryol	1, 2	6	Soph., Jr., Sr.	1
4.	Comp. Anat. Vertebrates	1, 2	6	Soph., Jr., Sr.	1
5.	Gen. Physiol	1, 2	6*	Soph., Jr., Sr.	1
6.	Experimental Zoology	1, 2	6	Jr., Sr.	1 and 3
7	Entomology	1, 2	3	Soph., Jr., Sr.	1
8.	Ichthyology	1	6*	Soph., Jr., Sr.	1
9.	Ornithology	2	3	Soph., Jr., Sr.	1
10.	History of Zoology	1	2	Jr., Sr.,	1
11.	Animal Habits—Intel	2	2	Jr., Sr.	See statement
12.	Economic Zoology	2	2	Jr., Sr.	1
13.	Teacher's Course	1	1	Jr,. Sr.	Eighteen credits
14.	Problems & Research	1, 2	6 or 12*	Jr., Sr.	See statement
15.	Entomol. & Ornith	1, 2	6*	Soph., Jr., Sr.	1
16.	Histol. & Embryol Technique	2	3	Soph., Jr., Sr.	1

*Both semesters must be completed before credit is given for the first semester.

1. GENERAL ZOOLOGY MESSRS. SIGERFOOS, OESTLUND, BROWN, DOWNEY, JOHNSON AND Okkelberg

Six credits (six hours per week) Both semesters

Open to all.

This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's *Manual of Zoology*.

2. MORPHOLOGY OF INVERTEBRATES MESSRS. SIGERFOOS AND JOHNSON

Six credits (six hours per week) Both semesters

Open to those who have completed course one; both semesters must be completed before credit is given for the first semester.

The object of this course is to familiarize the students with the methods and principles of zoology thru an intensive study of two or three groups of animals and to aquaint him with the minor phyla not considered in course one. During the year 1908-9 the Protozoa and Crustacea will be the groups especially taken up.

3. ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY, MESSRS. NACHTRIEB AND DOWNEY

Six credits (six hours per week) Both semesters

Open to those who have completed course 1.

In this course are taken up the development and minute structue of the animal as an organism built up of tissues combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

4. COMPARATIVE ANATOMY OF VERTEBRATES MESSRS. BROWN AND JOHNSON

Six credits (six hours per week) Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to the mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes, and laboratory work. Required text books: Davidson's *Mammalian Anatomy and* Burkholder's *Anatomy of the Brain*.

5. GENERAL PHYSIOLOGY MR. NACHTRIEB

Six credits (three hours per week) Both semesters

Open to those who have completed course one; both semesters must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relations to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

6. EXPERIMENTAL ZOOLOGY

Six credits (six hours per week) Both semesters

Open to those who have completed courses 1 and 3; both semesters must be completed before credit is given for the first semester.

7. ENTOMOLOGY MR. OESTLUND

Six credits (six hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

The course covers, in general, the elements of entomology, structure, functions development, and economics, leading up to a discusion of the principles of taxonomy and their application to the classification of insects. Folsom's *Entomology*, and Hertwig's *Zoology* are used as text-books and general guides.

8. ICHTHYOLOGY — MR. BROWN
Six credits (six hours per week) — First semester
Open to those who have completed course 1.

This course includes lectures, quizzes, and laboratory work in the structure, classification life history, and culture of fishes, with special reference to the fishes of our inland waters which are of economic importance.

9. ORNITHOLOGY — MR. BROWN
Six credits (six hours per week) — Second semester
Open to those who have completed course 1.

This course includes lectures, quizzes, laboratory and field work in the structure, classification, nest building, food, habits, and distinction of birds. The lectures consider the subjects of migration, coloration, flight, etc. Practical demonstrations are given of the preparation of birds and eggs for scientific purposes. Required: Chapman's *Hand-Book of Birds of Eastern North America.*

10. HISTORY OF ZOOLOGY — MR. NACHTRIEB
Two credits (two hours per week) — First semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course.

A course of lectures on the history of zoology from ancient times to the present including a brief history of our domestic animals and those that have become extinct within historic times, and a discussion of the modern theories and problems of heredity and evolution.

11. ANIMAL HABITS AND INTELLIGENCE — MR. NACHTRIEB
Two credits (two hours per week) — Second semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; alternates with course twelve. Not offered in 1909-10.

The course consists of lectures and discussions on animal habits and intelligence, and concludes with a consideration of the development of mental power in animals.

12. ECONOMIC ZOOLOGY — MR. NACHTRIEB
Two credits (two hours per week) — Second semester
Open to juniors and seniors; alternates with course 11.

Lectures on the uses made of animals and their products, the production and protection of those animals of special economic importance, and the methods of protection against some of the disease-producing animals.

13. TEACHERS' COURSE — MR. NACHTRIEB AND ASSISTANTS
One credit (one hour per week) — First semester
Open to those who have completed a minor in zoology; given in alternate years.

Lectures and discussions on the ends to be attained through courses in general zoology and the methods and means by which such ends may be gained.

14. PROBLEMS AND RESEARCH — MR. NACHTRIEB AND ASSISTANTS
Six or twelve credits (six or twelve hours per week) — Both semesters
Open to those who have completed courses 1 and 3 or 1 and such other work as may be required by the instructor in charge; both semesters must be completed before credit is given for the first semester.

The course consists of advanced or essentially independent work carried on in some specific line under the direction of the professor in charge of that work. The lines of work open at present are:—

(a)	Morphology of vertebrates under	Mr. Brown
(b)	Blood and connective tissue of vertebrates under	Mr. Downey
(c)	Entomology under	Mr. Oestlund
(d)	Experimental zoology	
(e)	General physiology under	Mr. Nachtrieb

(f)	Invertebrate embryology under	Mr. Sigerfoos
(g)	Invertebrate morfology under	Mr. Sigerfoos
(h)	Vertebrate embryology or morfology under	Mr. Nachtrieb

15. ELEMENTS OF ENTOMOLOGY AND ORNITHOLOGY, MESSRS. OESTLUND AND BROWN

Six credits (six hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

This course is planned with special reference to candidates for the teacher's certificate. During the first semester the class meets with Mr. Oestlund during the third and fourth hours on Monday, Wednesday and Friday. During the second semester the class meets with Mr. Brown on Monday, Wednesday and Friday at the hours arranged with him.

16. ESSENTIALS OF HISTOLOGICAL AND EMBRYOLOGICAL TECHNIQUE, MESSRS. NACHTRIEB AND DOWNEY

Three credits (six hours per week) Second semester

Open to juniors and seniors who have completed course 1 and the first semester of course 3.

This course consists essentially of practical work in the preparation and preservation of histological and embryological material, and in the methods of reconstruction.

ASTRONOMY

FRANCIS P. LEAVENWORTH, Professor, Head of the Department of Astronomy

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, courses 1 and 3 (the latter taken as a three hour course).

FOR A MAJOR, courses 1 and 3 (the latter taken as a six hour course) together with five additional courses and reinforcing subjects, (thirty credits,) selected from mathematics, physics, mechanics, chemistry, geology and additional astronomy.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) course 1, course 2 (as a six hour course) and six credits in physics.

ASTRONOMICAL OBSERVATORY

The Astronomical Observatory contains a ten and one-half-inch refracting telescope furnished with a third lens for converting it into a photographic telescope; a filar micrometer; a spectroscope by Brashear; a meridian circle and zenith telescope; a Repsold photographic measuring machine, a chronograph, and astronomical clocks.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Astronomy	1, 2	6	Jr., Sr.	Math. 4 or 2
2.	Observatory Practice	1, 2	6	Jr., Sr.	Math. 4 or 2
3.	Practical Astronomy	1, 2	6 or 12	Jr., Sr.	1 and Math. 7, 9 and 10
4.	Adv. Practical Astronomy	1, 2	6	Grad.	1 and 2
5.	Celestial Mechanics	1, 2	6	Grad.	1 and 2
6.	Astrophotography	1, 2	6	Grad.	1 and 2

1. GENERAL ASTRONOMY MR. LEAVENWORTH

Six credits (three hours per week) Both semesters

Open to juniors and seniors who have completed mathematics 4 or 2 (trigonometry).

A study of the general principles of astronomy illustrated by lantern slides and telescopic observations. This course may be combined with course 2.

2. **Observatory Practice** — Mr. Leavenworth
Six credits (three hours per week) — Both semesters
Open to those who have completed or are taking course 1.
Work at the observatory in connection with course one.

3. **Practical Astronomy** — Mr. Leavenworth
Six or twelve credits (three or six hours per week) — Both semesters
Open to juniors and seniors who have completed course 1 and mathematics 7, 9, and 10.

Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares.

4. **Advanced Practical Astronomy** — Mr. Leavenworth
Six credits (three hours per week) — Both semesters
Open to graduate students who have completed courses 1 and 3.

5. **Celestial Mechanics** — Mr. Leavenworth
Six credits (three hours per week) — Both semesters
Open to graduate students who have completed courses 1 and 3.

6. **Astrophotography** — Mr. Leavenworth
Both semesters
Open to graduate students who have completed courses 1 and 3.

Photography of the heavenly bodies, measurement of plates, determination of positions, parallax, etc.

BOTANY

Frederic E. Clements, Professor, Head of Department of Botany
Josephine E. Tilden, Assistant Professor
Carl Otto Rosendahl, Assistant Professor
Frederic K. Butters, Instructor
Ned L. Huff, Instructor
Alice Misz, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, courses 1 and 2.

For a Major, courses 1 and 2, together with one advanced course covering two semesters, and reinforcing subjects (thirty credits) selected from zoology, chemistry, physics, geology, advanced modern languages, Greek, Latin, and additional botany.

For B. A. with Distinction, the general requirements (page), courses 1, 2 and any two advanced courses, each covering both semesters.

For a Teacher's Certificate, an average of at least good in courses 1, 2 and twelve additional credits in biological sciences, of which six shall be in zoology.

Courses 11 and 16 are recommended.

Students entering the department for the first time must take course 1, or present a satisfactory equivalent. Courses 1 and 2 are required for entrance to all advanced courses, with the exception of 11 to 15. Students are requested to confer with the head of the department before electing an advanced course.

The Botanical Seminar consists of advanced students in botany, together with the staff of the department. It meets every two weeks for the presentation of the results of investigation, and for the discussion of current problems.

The laboratory fee for each undergraduate course is three dollars per semester.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Botany	1, 2	6*	All	None
2.	Adv. Botany	1, 2	6	Soph., Jr., Sr.	1
3.	Plant Phys. and Ecology	1, 2	6	Soph,. Jr., Sr.	See statement
4.	Algae	1, 2	6	Jr., Sr.	1 and 2
5.	Fungi	1, 2	6	Jr., Sr.	1 and 2
6.	Mosses and Ferns	1, 2	6	Jr., Sr.	1 and 2
7.	Flowering Plants	1, 2	6	Jr., Sr	1 and 2
8.	Ecology	1, 2	6	Jr., Sr.	1, 2 and 3
9.	Plant Physiology	1, 2	6	Jr., Sr.	1, 2 and 3
10.	Cytology	1, 2	6	Jr. Sr.	1 and 2
11.	Industrial Botany	1, 2	6	Jr., Sr.	1 and 2
13.	Water Supply Botany	2	3	Jr., Sr.	1
14.	Timber and Timber Diseases	1	3	Soph., Jr., Sr.	1
15.	Bot. Microchemistry	1, 2	3	Soph., Jr., Sr.	1
16.	Plant Studies	1, 2	3	Jr., Sr.	1 and 2
17.	Morph. and Taxonomy	1, 2	..	Grad.	See statement
18.	Problems in Algology	1, 2	..	Grad.	See statement
19.	Problems in Phys. and Ecology	1, 2	..	Grad.	See statement
20.	Problems in Cytology	1, 2	..	Grad.	See statement

*Both semesters must be completed before credit is given for the first semester

GENERAL COURSES

Required for entrance to any special course, except those in technical botany 11 to 15 inclusive.

1. General Botany — Messrs. Clements, Huff and Butters and Miss Misz.

Six credits (six hours per week) — Both semesters

Open to all; both semesters must be completed before credit is given for the first semester.

Greenhouse study of the behavior and structure of flowering plants, following the life cycle from germination to seed production; laboratory study of the evolution of the plant kingdom, and the underlying principles of plant life; laboratory and greenhouse work in the identification and relationship of flowering plants, together with field work on the plants of forest and grassland; practical papers on selected topics, viz., bacteria, plant growth, evolution, etc.

2. Advanced Botany — Mr. Clements and Mr. Rosendahl

Six credits (six hours per week) — Both semesters

Open to those who have completed course 1.

Systematic work in the naming and classification of plants, chiefly of the groups of economic importance, i. e., flowering plants, fungi and algae, with emphasis on the common plants of Minnesota; ecological study in the greenhouse of the structure and meaning of the adaptions of root, stem and leaf, and in the field of the principles of plant distribution, migration and grouping; cell study of growth, production of pollen and egg-cells, fertilization hybridization and seed formation; one practical paper each semester, cytology of plant breeding, plant adaptations, the life history of a forest, etc.

SPECIAL COURSES

3. Plant Physiology and Ecology — Messrs. Clements and Huff

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2.

Study of the factors which make the plant's home, viz., water, light, soil, heat, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc. of plants; one practical paper each semester on selected topics, e. g., acclimatization, adaptation, origin of new forms, vegetation of Minnesota, of North America, etc.

4. Algae — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

A detailed comparative study of the structure and classification of the algae; the blue-green and yellow-green algae, together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. FUNGI — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The classification and life-history of the various groups of fungi based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. MOSSES AND FERNS — MESSRS. ROSENDAHL AND HUFF
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lectures, laboratory and field work.

7. FLOWERING PLANTS — MR. ROSENDAHL
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory greenhouse and herbarium work. together with field work in the fall and spring.

8. ECOLOGY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. PLANT PHYSIOLOGY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability and reproduction. Class discussions and quizzes, greenhouse and field work.

10. CYTOLOGY — MR. ROSENDAHL
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis, together with a review of the history of cytologic investigation. Methods of cytological research indicated in the laboratory. Laboratory work and collateral reading.

11. INDUSTRIAL BOTANY — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to technical students who have completed courses 1, and to academic students who have completed courses 1 and 2.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

13. WATER SUPPLY BOTANY — MISS TILDEN
Three credits (six hours per week) — Second semester

Open to those who have completed course 1.

A technical course for municipal, sanitary and reclamation engineers, involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.

14. TIMBER AND TIMBER DISEASES — MR. HUFF
Three credits (six hours per week) — First semester

Open to those who have completed course 1.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work and references.

15. BOTANICAL MICROCHEMISTRY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed course 1.

A microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.

16. PLANT STUDIES AND METHODS — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are to be taught and not from the university point of view; the material is taken up in detail in its proper sequence, and training in method is afforded as far as possible by practice in the elementary school of the College of Education.

GRADUATE COURSES

17. MORPHOLOGY AND TAXONOMY — MR. ROSENDAHL
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Important literature and necessary material will be provided for whatever research is entered upon, and the results of the investigations will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it.

18. PROBLEMS IN ALGOLOGY — MISS TILDEN
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be done on special groups or along any of the following lines: The freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-depositing algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island, which is open during the summer vacation.

19. PROBLEMS IN PHYSIOLOGY AND ECOLOGY MR. CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Opportunity for research work in ecology and physiology is offered along the following lines: Critical investigation of the physical factors of the habitat by means of instruments; studies in plant functions and adaptations; the experimental production of new forms; investigations in the development and structure of vegetation, and especially in migration, competition, etc.

20. PROBLEMS IN CYTOLOGY AND EMBRYOLOGY MR. CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be taken along any of the following lines: The minute structure of the cell; microchemistry of the cell; development of sporangia and spores; fecundation; development of the embryo; origan and development of the primary tissues; development of organs; correlation, etc.

CHEMISTRY

GEORGE B. FRANKFORTER, Professor, Head of Department of Chemistry
CHARLES F. SIDENER, Professor
EDWARD E. NICHOLSON, Assistant Professor
EVERHART P. HARDING, Assistant Professor
IRA H. DERBY, Assistant Professor
LILLIAN COHEN, Instructor
FRANCIS C. FRARY, Instructor
JOHN A. HANDY, Instructor
JAMES ZIMMERMAN, Instructor
WALTER BADGER, Assistant
CHARLES R. CRESSY, Assistant
EDWARD ANDERSON, Assistant
EDITH VON KUSTER, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with supporting subjects (thirty credits) selected from physics, mathematics, geology, botany, zoology, advanced modern language and additional chemistry.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 1, 2, 3, 4 or 5, and 26.

The laboratory fee for each undergraduate course is five dollars per semester, except for course 4, which is seven dollars, for course 5, which is ten dollars, for course 26, which is three dollars, and for courses 6, 24 and 25, having no fee.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Gen. Chem.	1, 2	6*†	Those who enter without chemistry	
2.	Adv. Gen. Chem.	1, 2	6*	Those who enter with chemistry?	Entrance credit in chemistry
3.	Qual. Anal.	1, 2	6	Soph., Jr., Sr.	1 and 2
4.	Quant. Anal.	1, 2	6	Jr. Sr	3
5.	Organic Chem.	2	6	Jr., Sr.	3
6.	Theoretical Chemistry	2	2	Jr., Sr.	5
18.	Physical Chemistry	1, 2	3	Jr., Sr.	Chemistry 5 Physics 3 and 4
24.	Theoretical Electrochemistry	1	3	Sr., Jr.	Same as for Physical Chem.
25.	Radiochemistry	2	3	Jr., Sr.	24
26.	Teachers	2	1	Sr.	3
27.	Household and Sanitary Science	1, 2	6*	Jr., Sr.	1 or 2
28.	Spec. Inorganic			Grad.	
29.	Electrochemistry			Grad.	
30.	Organic Chemistry			Grad.	
31.	Alkaloids			Grad.	
32.	Analytical Chemistry			Grad.	

*Both semesters must be completed before credit is given for the first semester.

†Juniors and seniors are allowed only half credit.

1. GENERAL CHEMISTRY — MISS COHEN AND MR. BADGER

Six credits (six hours per week) — Both semesters

Open to all who do not present any entrance credits in chemistry, but juniors and seniors receive only half credit; both semesters must be completed before cerdit is given for the first semester.

Recitation and laboratory work. The course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.

2. ADVANCED GENERAL CHEMISTRY — MR. FRANKFORTER, MISS COHEN AND MR. BADGER

Six credits (six hours per week) — Both semesters

Open to all who have completed a satisfactory course in general chemistry; both semesters must be completed before credit is given for the first semester.

Lectures and laboratory work. The ground covered includes an introduction to physical and technological chemistry with an exhaustive study of the chemical elements.

3. QUALITATIVE ANALYSIS — MESSRS. NICHOLSON AND FRARY

Six credits (six hours per week) — Both semesters

Open to those who have completed course 2

Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. QUANTITATIVE-ANALYSIS — MR. SIDENER AND ASSISTANTS

Six credits (six hours per week) — First and Second semesters

Prerequisite, Course 3.

The laboratory fee is seven dollars per semester.

The course includes a general discussion of quantitative method,s with laboratory work in gravimetric analysis, first semester; followed by a discussion of standard solutions and the necessary stoechiometric calculations with laboratory work in volumetric analysis, second semester.

5. ORGANIC CHEMISTRY, MESSRS. FRANKFORTER, DERBY, HANDY AND ASSISTANTS
Six credits (three lectures and twelve hours of laboratory work per week)
Second semester

Prerequisite, Course 3.

This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.

6. THEORETICAL CHEMISTRY MR. DERBY
Two credits (one lecture and one recitation per week) Second semester
Prerequisite, Course 5.

This course involves a study of the most important theories which coordinate and unify chemical and physico-chemical phenomena.

18. PHYSICAL CHEMISTRY MR. DERBY
Three credits. First and second semesters
Prerequisites, Chemistry 5, Physics 3 and 4.

The course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

24.* THEORETICAL ELECTROCHEMISTRY MR. DERBY
Three credits. First semester
Prerequisites, Same as for Physical Chemistry.

This course includes the development of the most modern ideas relative to electrochemical principles and phenomena, involving therewith the electron theory and electrical nature of matter.

25. RADIOCHEMISTRY MR. DERBY
Three credits. Second semester

This course is intended to follow the one in Theoretical Electrochemistry and has to do with the phenomena associated with the various radioactive elements including the chemical change which these elements undergo and the chemical reactions which may be induced while the changes are in progress.

26. TEACHER'S COURSE MISS COHEN
Two credits (two hours per week) Second semester
Prerequisites, Course 3.

The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

27. HOUSEHOLD AND SANITARY SCIENCE MR. FRANKFORTER
Six credits Both semesters

To obtain credit both semesters must be taken.

Open to women of the junior and senior classes.

Sanitation: Causes and control of germ diseases, disinfection, pests, etc.

Foodstuffs: origin, preparation, purity, analysis and adulteration, selection, preparation, preservation.

Personal Hygiene: dietetics, food values, clothing, exercise, etc.

The following professors will cooperate in giving the course; Messrs. Westbrook, Beard, Clements, Flather, Nachtrieb and Bass.

GRADUATE COURSES

The following are open to graduate students. Arrangements may be made upon application to the department.

28. SPECIAL INORGANIC CHEMISTRY.

29. ELECTROCHEMISTRY.

30. ORGANIC CHEMISTRY.

31. ALKALOIDS.

32. ANALYTICAL CHEMISTRY.

COMPARATIVE PHILOLOGY

FREDERICK KLAEBER, Professor, Head of Department of Comparative Philology

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, courses 1, 2, 3, 4, 6.

FOR A MAJOR, courses 1, 2, 3, 4, 5, 6, together with two additional courses and reinforcing subjects (thirty credits) selected from English, ancient languages and advanced modern languages.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and English 3, 4 and 22 or English 3 and German 14 in addition to the requirements for a major.

This department, besides offering courses in the general principles of linguistic science, affords an opportunity for elementary studies in comparative Indo-European philology, and more particularly the investigation of Old Germanic dialects. Related courses in English philology will be found under English language and literature.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Sc. of Lang.	1	2	Soph, Jr., Sr.,	None
2.	Life of Words	2	2	Soph., Jr., Sr.	None
3.	Teuton. Philol.	2	2	Soph., Jr., Sr.	None
4.	Esperanto	1	2	Jr., Sr.	None
5.	Seminar	2	2	Jr., Sr.	1
6.	Comp. Phonology	2	2	Jr., Sr.	See statement
7.	Comp. Grammar	..	..	Grad.	
8.	Gothic	..	..	Grad.	
9.	Urgerm. Gram.	..	..	Grad.	
10.	Old Saxon	..	..	Grad.	
11.	Old High German	..	..	Grad.	

1. GENERAL INTRODUCTION TO THE SCIENCE OF LANGUAGE — MR. KLAEBER

Two credits (two hours per week) — First semester

Open to sophomores, juniors, and seniors.

This course will be sufficiently general in its nature to be of use to all students who wish to obtain an insight into the life of language.

2. THE LIFE OF WORDS — MR. KLAEBER

Two credits (two hours per week) — Second semester

Open to sophomores, juniors, and seniors; alternates with course 3.

Etymology and semasiology. Growth of vocabulary; change of words in form and meaning. Lectures and exercises with special reference to English and other Germanic languages.

3. INTRODUCTION TO TEUTONIC PHILOLOGY — MR. KLAEBER

Two credits (two hours per week) — Second semester

Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 2.

History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the Germanic languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German)

4. ESPERANTO AND THE IDEA OF AN INTERNATIONAL LANGUAGE — MR. KLAEBER

Two credits (two hours per week) — First semester

Open to juniors and seniors.

Comparison of the principal families of languages in grammatical and lexical respects. History of the movement for the creation of an international language. Consideration of the merits of Volapuk, Esperanto, and other artificial languages. Exercises in Esperanto.

5. PHILOLOGICAL SEMINAR — MR. KLAEBER

Two credits (two hours per week) — Second semester

Open to juniors and seniors who have completed course 1; alternates with course 6

Investigation of linguistic problems. Study of standard works (Paul, Delbrueck Wundt, Jespersen, etc.). Reports on recent publications.

6. COMPARATIVE PHONOLOGY OF ENGLISH AND GERMAN — MR. KLAEBER

Two credits (two hours per week) — Second semester

Open to juniors and seniors who have a fair knowledge of German. Alternates with course 5.

Elements of phonetics; history of English and German sounds; orthography. The lectures will be supplemented by practical exercises.

7. COMPARATIVE GRAMMAR OF THE GREEK, LATIN, AND GERMANIC LANGUAGES MR. KLAEBER

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

A general survey of the field of Indo-Germanic philology will be included.

8. GOTHIC — MR. KLAEBER

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

The relation of Gothic to other Germanic dialects will be particularly emphasized. Study of the grammar (Braune, J. Wright, Streitberg) and reading of the gospels (Heyne's *Ulfilas*, 10th edition).

9. URGERMANISCHE GRAMMATIK — MR. KLAEBER

Open to graduate students who have completed couse 8; other arrangements may be ascertained upon application to the department.

Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, et al.).

10. OLD SAXON — MR. KLAEBER

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

Old Saxon Grammar and interpretation of the *Heliand*.

11. OLD HIGH GERMAN — MR. KLAEBER

Open to graduates who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

Braune's *Althochdeutsche Grammatik*; Braune's *Althochdeutsches Lesebuch*.

This course is identical with German 14.

DRAWING

HENRIETTE CLOPATH, Instructor
MAUDE STEWARD, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

A MAJOR is not offered.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 1, 2, 3, 5 and 6

COURSES

No.	Title	Semester	Credit	Offered to	Prereq. courses
1.	Drawing and Painting in Representation	1, 2	6*	Soph., Jr., Sr.	None
2.	Adv. Drawing and Painting	1, 2	6	Jr. Sr.,	1
3.	Design	1, 2	6	Jr., Sr.	1 or 2
4.	2nd year Design	1, 2	6	Sr.	3
5.	Drawing and Education	1	3	Sr.	1 and 3
6.	Teaching of Drawing	1	1	Sr.	5

DRAWING AND PAINTING IN REPRESENTATION, MISS CLOPATH AND MISS STEWARD

Six credits (six hours per week) Both semesters

Open to sophomores (with the permission of the instructor), juniors and seniors.

The course consists of drawing of plant-form and landscape in pencil, in water color and in charcoal; the study of perspective and drawing of still life; drawing from the cast and sketching from life. Not credited toward a minor.

After having completed course 1 students may elect either course 2 or course 3.

2. ADVANCED DRAWING AND PAINTING MISS CLOPATH

Six credits (six hours per week) Both semesters

Open to juniors and seniors who have completed course 1.

More advanced work in cast drawing. Still life studies and figure poses in black and white and in color.

3. DESIGN MISS STEWARD

Six credits (six hours per week) Both semesters

Open to juniors and seniors who have completed course 1 or its equivalent.

The course includes the study of pure design and design in representation. Pure design: arrangement of lines, tones, and colors, in accordance with the principles of harmony, balance and rhythm. Historic ornament is introduced to show the application of these principles. Design in representation: the fundamental relation of design to pictorial art; composition as applied to plant form, landscape, still-life, and life drawing; compositions of the masters, and the making of original compositions.

4. DESIGN MISS STEWARD

Six credits (six hours per week) Both semesters

Open to seniors who have completed course 3.

This course includes advanced composition, book-decoration with especial attention to lettering, designs for stained glass, and design applied to leather, pottery, metal, and embroidery.

5. DRAWING AS RELATED TO EDUCATION MISS CLOPATH

Six credits (six hours per week) First semester

Open to seniors who have completed courses 1 and 3.

Exercises in all of the different kinds of work used in the schools; advanced work in black and white and in color.

6. THE TEACHING OF DRAWING MISS CLOPATH

One credit (two hours per week) Second semester

This course in conducted by lectures and collateral reading. Study of the methods that have proved most successful in public school teaching; the planning of work appropriate for each grade; the value and relation of art work in education as revealed through a study of the instincts and mental processes of the child.

ECONOMICS AND POLITICAL SCIENCE

JOHN H. GRAY, Professor, Head of Department of Economics and Political Science
EDWARD V. ROBINSON, Professor
WILLIAM A. SCHAPER, Professor
THOMAS WARNER MITCHELL, Assistant Professor
RAYMOND V. PHELAN, Instructor
CEPHAS D. ALLIN, Instructor
JOHN L. COULTER, Instructor
EUGENE T. LIES, Lecturer
JEREMIAH S. YOUNG, Ph.D., Assistant Professor, Extension Work
RALPH H. HESS, P .D., Assistant Professor, Extension Work

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, all in Economics or all in Political Science.

FOR A MAJOR, eighteen credits, all in Economics or all in Political Science, together with reinforcing subjects (thirty credits) selected from the other line of work in the department (twelve credits of which are required), history and sociology (six credits in case of an ordinary major and twelve credits in case of B. A. with distinction being required), and additional economics and political science.

FOR B. A. WITH DISTINCTION, the general requirements (page 46), six credits in addition to the requirements for a major and in the same line, and the filing of a typewritten copy of the thesis in the department.

FOR A TEACHER'S CERTIFICATE, the following: in business subjects, including commercial geography, a major in economics, with an average of at least good; in government, a major in political science, with an average of at least good.

The departments of economics and political science, history, and sociology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one of the departments of the social science group ought to be familiar at least with the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others. To students who are interested in the work of these departments, but who do not care to elect their major before the end of the sophomore year, the departmenes unite in the following recommendations for the freshmen and sophomore years:

GENERAL RECOMMENDATIONS

I. Freshman and Sophomore Years:

1. The student should take the elementary work of each department within the group as early as possible. Accordingly the following courses are recommended:

Freshman year: history 2 (English constitutional): sophomore year: history 5 (American); economics 1, first or second semester; political science 1, first or second semester.

2. The student is advised to take in these years his required minor in science from the departments of botany or animal biology, and his required minor in language from the French or German beginning courses, unless he has a reading knowledge of both these languages at entrance.

II. Junior and Senior Years:
Elective under the direction of advisor selected from the department in which tne major subject is taken.

SUGGESTIONS TO STUDENTS

The work in economics and political science bears very directly on preparation for professional or business life and citizenship, no matter what occupation is finally chosen. But in order to aid students who have some idea as to their intended profession or calling to make a wise choice of courses, the following tabulated statement has been prepared.

Students intending to enter the law, for example, will find in the left-hand column the numbers of certain courses which are recommended to form a minor in economics; and in the next column, some additional courses which are suggested for those taking a major in economics. At the right, in like manner, are given the recommendations for a minor and a major in political science.

It should be noted: (1) that these recommendations are merely suggestive, not binding; (2) that more courses are sometimes recommended than suffice to make up a technical minor or major with the understanding that the student will consult the instructors and choose those courses which interest him the most.

Economics 1 and political science 1 are not included in these recommendations, as they must in any case precede the advanced courses; nor is economics 4 included, as it is required of all taking a major in economics.

Students desiring merely a general acquaintance with economics or political science as part of a liberal education and as a preparation for citizenship are recommended to take the introductory courses and such others, amounting at least to a minor, as their interests may indicate.

ECONOMICS			POLITICAL SCIENCE	
Courses advised for a minor	Additional advised for a major	In Preparation for	Courses advised for a minor	Additional advised for a major
6, 7, 11, 10, 15	5a, 5b, 8, 9, 30a	Law	2, 3, 7, 8, 15, 17	4, 5, 10, 9, 12, 14, 20, 19, 18
3a, 3b, 6, 7, 11, 10	29, 14, 15	Public Service	2, 3, 7, 15, 14, 9, 18, 20	8, 4, 5, 10, 12, 19, 17
2, 3a, 3b, 22, 12, 13, 29	5a, 5b, 19, 20a, 8, 9	Consular and Diplomatic Service	2, 3, 5, 10, 14, 20, 19, 18	4, 8, 12, 17
5a, 5b, 6, 7, 11, 10	29, 30a, 16, 14	Journalism	2, 3, 7, 8, 9, 10, 17 20	4, 5, 12, 18, 19
8, 9, 11, 10	16, 20a, 20b, 21, 19	Engineering or Railway Service	6, 7, 14, 15	4, 8, 20
2, 12, 13, 11, 16, 22	20a, 21, 19, 29	Chemistry or Manufactures	2, 3, 7, 9	8, 12, 14, 18, 20
8, 9, 11, 16, 22	2, 12, 13, 21	Mining	2, 3, 7, 15, 9	8, 12, 14, 20
5a, 5b, 26a, 26b 29	20a, 20b, 20c, 21 25a	Insurance or Banking	2, 3, 7, 14, 15, 17	4, 8, 10, 12, 20
2, 3a, 3b, 5a, 5b, 12, 13	20a, 21, 19, 25, 27, 28	General Business	2, 3, 7, 15, 9, 17	8, 12, 19, 20
24a, 24b, 22, 2, 23, 12, 13	8, 9, 5a, 20a, 21	Forestry or Agriculture	2, 3, 15, 14	9, 12, 8, 20
2, 3a, 3b, 5a, 5b, 30a	20a, 21, 19, 30b	Teaching Business Subjects or American Government	2, 3, 7, 9, 15, 17, 18, 20	4, 5, 12, 10, 8, 14, 19
1, 3a, 3b, 5a, 18	6, 7, 11, 10	Medicine	2, 3, 7, 9	8, 12, 15, 20
3a, 3b, 16, 17, 18	14, 15, 30a or 30b	Charity Work or the Ministry	2, 3, 7, 8, 17	9, 12, 15, 18, 20

ECONOMICS

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
	Introductory Courses:				
1.	Elements of Economics......	1 or 2	3	Soph., Jr., Sr.	None
2a.	Economic Geography of United States	1	3	Soph., Jr., Sr.	None
2b.	Economic Geography of Foreign Countries.....	2	3	Soph., Jr., Sr.	2a
3a.	Industrial History of Europe	1	3	Soph., Jr., Sr.	None
3b.	Industrial History of the United States.........	2	3	Soph., Jr., Sr.	3a
	General Courses:				
4.	Advanced Economics.......	2	3	Soph., Jr., Sr.	1
5a.	Money and Banking.........	2	3	Soph., Jr., Sr.	1
5b.	Financ. Hist of the U. S.....	2	3	Jr., Sr.	1 and 5a
6.	Public Finance.............	1	3	Jr., Sr.	1
7.	Problems in Taxation.......	2	3	Jr., Sr.	6
8.	Econs. of Transportation....	2	3	Jr., Sr.	1
9	.*Railway Problems..........	1	3	Jr., Sr.	1
10.	Municipal Industries.........	2	3	Jr., Sr.	1
11.	The Modern Bus. Corporation	1	3	Jr., Sr.	1
12.	*Economics of Commerce....	1	3	Jr., Sr.	1, 2 or 3a
13.	*Econ. of Colonization......	2	3	Soph., Jr., Sr.	1, 2 or 3a
14.	*Economic Reforms.........	1	3	Jr., Sr.	1
5.	*The State in Relation to Industry...............	2	3	Jr., Sr.	14
16.	Labor Problems, Part I......	1	3	Jr., Sr.	1
17.	Labor Problems, Part II.....	2	3	Jr., Sr.	1 and 16
18.	Economic Conditions in American Cities.......	1 or 2	3	Jr., Sr.	1 or 3b, or Soc. 1
	Business Courses:				
19.	Business Organization.......	2	3	Soph., Jr., Sr.	1
20a.	The Principles of Accounting.	1	3	Jr., Sr.	1
20b.	Corporation Accounting.....	2	3	Jr., Sr.	20a
20c.	*Problems in Accounting.....	1	3	Sr.	1, 20a, 20b
20d.	*Auditing.................	1	3	Sr.	1, 20a, 20b
21.	Business Law..............	2	3	Soph., Jr., Sr.	1
22.	Materials of Commerce......	2	3	Soph., Jr., Sr.	2
23.	Economics of Forestry and Irrigation............	1	3	Jr., Sr.	1 or 2
24a.	History of Agriculture.......	1	3	Jr., Sr.	1 or 2
24b.	Economics of Agriculture....	2	3	Jr., Sr.	24a
25a.	*Economics of Investment and Speculation.......	1	3	Jr., Sr.	1 and 5a
25b.	*Mathematics of Investment.	1	3	Jr., Sr.	Math. 3 and Econ. 1
26a.	*Personal Insurance.........	2	3	Jr., Sr.	1
26b.	*Property Insurance........	2	3	Jr., Sr.	1
27.	*Commercial Credit.........	2	3	Jr., Sr.	1 and 19
28.	*Advertising...............	2	3	Jr., Sr.	1 and 19

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
	ADVANCED AND GRADUATE COURSES:				
29.	*Theory and Practice of Statistics.............	1	2	Jr., Sr.	Six credits in Econ.
30a.	*Hist. of Econ. Thought.....	1	2	Jr., Sr.	Six credits in Econ.
30b.	*Methods of Investigation and Instruction.......	2	2	Jr., Sr.	Six credits in Econ.
31.	Seminar in Economics.......	1, 2,	6	Sr.	Twelve credits in Ec.

*Starred courses are not given every year.

INTRODUCTORY COURSES

1. ELEMENTS OF ECONOMICS MESSRS. ROBINSON, PHELAN AND COULTER

Three credits (three hours per week) Each semester

Open to sophomores, juniors, and seniors; designed for those who desire a general knowledge of economics and as an introduction to the more advanced courses offered in the department. Required of all taking the six year medical course.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems. McVey's *Outline* and a text-book, supplemented by lectures and problems, with a weekly quiz.

2a. ECONOMIC GEOGRAPHY OF THE UNITED STATES MR. ROBINSON

Three credits (three hours per week) First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces: (1) a brief survey of the stages of economic development; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a study of the United States and its outlying possessions with referense to: (a) natural controls and resources; (b), labor and capital goods as factors in production; (c), localization and commercial importance of the principal extractive industries, viz., fishing, forestry, grazing, farming and mining; (d), ditto, of the principal manufacturing and distributive industries, including especially foreign commerce.

2b. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES MR. ROBINSON

Three credits (three hours per week) Second semester

Open to those who have completed course 2a

(4) A study of the natural resources, chief industries, commercial products, and commercial relations of the leading foreign countries. Special attention is given to international competition for foreign markets, to international trade routes, both by land and sea, and to countries, such as Canada, Latin America and the Orient, which have a large prospective value as markets for American manufactures and as fields for the investment of American capital.

Text book supplemented by lectures and reports.

3a. MODERN INDUSTRIAL AND COMMERCIAL HISTORY OF EUROPE, MR. GRAY

Three credits (three hours per week) First semester

The industrial and commercial development of the chief European countries since the middle of the 18th century with special attention to Great Britain. The effects of mechanical invention and political change on industry and trade.

Course 3a requires no preliminary course and may be taken advantageously with course 1 or course 2. (see course 3b)

3b. THE INDUSTRIAL AND COMMERCIAL HISTORY OF THE UNITED STATES MR. GRAY

Three credits (three hours per week) Second semester

Open to those who have had 3a.

Courses 3a and 3b are conducted each with a text book, supplemented by lectures and prescribed topical readings. In each of these courses, one written report of considerable length will be required each semester.

GENERAL COURSES

4. ADVANCED ECONOMICS — MR. ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted to a study of recent theories of distribution.

Assigned readings, reports, and discussions.

5a. MONEY AND BANKING — MR. PHELAN
Three credits (three hours per week) — Each semester

Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

5b. FINANCIAL HISTORY OF THE UNITED STATES — MR. PHELAN
Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 and 5a.

The main lines of our financial development, that is our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, topics, and discussions.

6. PUBLIC FINANCE — MR. ROBINSON
Three credits (three hours per week) — First semester

Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION — MR. ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, income and inheritance taxes. Based on Seligman, and reports of state tax commissions, with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION — MR. ROBINSON
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1 and to students in the technical colleges. Offered especially for students of engineering.

A general course on the history and theory of transportation and communication with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcel post and express service; economic functions and relations of highways, interurban electric lines, steam railways, inland waterways, and ocean transportation; the organization of ocean commerce. Lectures, assigned readings, and discussions.

9. RAILWAY PROBLEMS — MR. ROBINSON
Three credits (three hours per week) — First semester

Open to those who have completed course 1

A course devoted to the study of railway problems and administration, including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5) the great railway systems of the United States; (6) regulation by the states and the federal government; (7) government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings, and special topics.

10. MUNICIPAL INDUSTRIES — MR. GRAY
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1; if possible, should be preceded by course 11.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership. Text-books, lectures, and quizzes.

11. THE MODERN BUSINESS CORPORATION — MR. GRAY
Three credits (three hours per week.) — First semester

Open to those who have completed course 1.

The organizing, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. Text-books; Ripley, *Trusts, Pools, and Corporations*, Meade's *Trust Finance*, Wyman's *Cases*. Lectures, class discussions, and reports.

12. ECONOMICS OF COMMERCE — MR. ROBINSON
Three credits (three hours per week) — First semester

Open to those who have completed course 1, 2, or 3a.

Causes and characteristics of commercial crises; history, theory and mechanism of international commerce; free trade, reciprocity and protection, with special emphasis on the tariff history and policy of the United States; the balance of trade; economic causes of the contest for foreign markets; organization of the export trade, commercial treaties and foreign politics; the consular and diplomatic service as a factor in commerce. Lectures, assigned readings, and reports on special topics.

13. ECONOMICS OF COLONIZATION — MR. ROBINSON
Three credits (three hours per week) — Second semester

Open to those who have completed course 1, 2, or 3a. Forms with course 12 in Political Science, a year course on colonization.

The economic causes of human migration; historical survey of colonization and classification of colonies with reference to their economic bases; existing colonial systems, with special attention to the outlying possessions of the United States; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings, and reports on special topics.

14. ECONOMIC REFORMS — MR. PHELAN
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

A study of Utopias and economic reforms from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform. Lectures, assigned readings, reports, and discussions.

15. THE STATE IN RELATION TO INDUSTRY — MR. PHELAN
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed courses 1 and 14.

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; the results of economic legislation designed to limit the freedom, or raise the plane, of competition. General survey of the relation of the state to industry. Lectures, assigned readings, and reports.

16. LABOR PROBLEMS: Part I — MR. PHELAN
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social wellbeing through improvements in the working and living conditions of the laboring classes. Lectures' text-book, assigned readings, and discussions.

17. LABOR PROBLEMS: Part II — MR. PHELAN
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1, but should also be preceded by course 16.

A study of immigrants in America, with reference to their economic contributions; the economic conditions in foreign countries that lead to emigration; the general problem of immigration; the special economic problems of the Slav, the Italian, the negro, the Chinese and the Japanese. Lectures, text-book, topics and discussions.

18. ECONOMIC CONDITIONS IN AMERICAN CITIES, — MR. LIES

Open to juniors and seniors who have completed course 1, course 8a, or sociology 1; required in the six year medical course.

A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment. Given by lectures with assigned readings and visits of inspection in the Twin Cities.

BUSINESS COURSES

19. BUSINESS ORGANIZATION — MR. MITCHELL
Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

General organization of the business field for productive efficiency. Competitive vs monopolistic industry. Division of industry as a problem before the entrepreneur. The importance of division and organization of production processes within the individual plant. Mismanagement and waste. The internal organization and management of large scale industry disclosing the elements of its technical advantages. Typical manufacturing and mercantile concerns in success and failure. Based on Sparling's *Introduction to Business Organization* with lectures, assigned reading, and discussions.

20a. THE PRINCIPLES OF ACCOUNTING — MR. MITCHELL
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

Fundamentals in the theory and practice of accounting with a view to general business efficiency. The accountant, his essential qualities and work. Aims and essentials of a desirable system of accounts. The mathematical philosophy underlying all accountancy developing the demonstration of the principal specific fields of accounting. Practical application of all points of theory through numerous accounting sets taken from those in actual use in the business field.

Largely a laboratory course, with text and lectures.

20b. CORPORATION ACCOUNTING — MR. MITCHELL
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed courses 1 and 20a.

The theory and general practice of modern systems of expert accounting. The general corporation and its financial accounts. The operating accounts, general office accounts, and reports, of manufactures, telegraph and express companies, banks, insurance companies, and transportation companies. Special studies in cost, voucher, and loose leaf systems. Economical accounts. Examination of typical published reports from the standpoint of accountancy and interpretation. Inspection of the systems of running corporations.

20c. PROBLEMS IN EXPERT ACCOUNTING MR. MITCHELL
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed courses 1, 20a and 20b.

Lectures on concrete problems of the type confronting the general public accountant and class exercises taken largely from examinations for chartered public accountants, the aim being to give such information as shall be most suggestive and useful in preparing for C. P. A. examinations. Given alternate years with course 20d.

20d. AUDITING MR. MITCHELL
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed courses 1, 20a and 20b.

The principal duties and qualifications of the auditor. The nature of his work and the problems that confront him. Auditing in the various types of industries. Numerous practical problems and audits of books of going concerns. Lectures and laboratory. Given alternate years with course 20c.

21. ELEMENTS OF BUSINESS LAW
Three credits (three hours per week) Second semester
Open to those who have completed course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in every day business affairs. Assigned readings, lectures, and quizzes.

22. MATERIALS OF COMMERCE MR. COULTER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 2a.

A study of the principal wares of commerce with reference to sources, uses and industrial processes. Text with collateral reading, lectures and visits of inspection.

23. ECONOMICS OF FORESTRY AND IRRIGATION MR. COULTER
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection, special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering: (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

24a. HISTORY AND LITERATURE OF AGRICULTURAL INDUSTRIES MR. COULTER
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1 or 2.

Historic development of, and attitude toward, agriculture in ancient, mediaeval and modern times, and comparison of systems with reference to stage of economic development and geographic conditions. A more detailed study of the history of agriculture in the United States. Lectures, assigned readings, reports on special topics, quiz.

24b. ECONOMICS OF AGRICULTURAL INDUSTRIES MR. COULTER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 24a, and others by special permission.

Economic principles which underlie farm and estate management, land values, and prices of farm produce; preparations of produce for market, market and transportation problems. The size, ownership, organization and labor system of farms as bearing on economic efficiency and social and political conditions. Farm organizations and co-operation. Lectures, assigned readings, reports on special topics, quiz.

25a. INVESTMENT AND SPECULATION — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 5a.

The social significance of the processes of saving and investing. Private property as the basis of investment. Funds, credit instruments and other machinery of investment. Investment markets. Historic investment opportunities, transition periods, and effect of economic progress. Laws of investment values and causes affecting values. Special studies in the various classes of investments, real estate, loans, general business, stocks and bonds. Organization and working of stock and produce exchanges. Wall Street. Investment vs. Speculation vs. Gambling.

Lectures, assigned readings and exercises in the interpretation of quotations, financial articles and market reports.

Given alternate years with course 25b.

25b. THE MATHEMATICS AND ACCOUNTANCY OF INVESTMENT — MR. MITCHELL
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed Mathematics 3 and Economics 1.

A study of the mathematical principles underlying computations in foreign exchange, banking, statistical investigation, insurance, building and loan associations, trust company business, bond issues, sinking funds etc. The development of the formulas and tables used in such computations and numerous practical problems. The accountancy of earnings, interest, depreciation and fluctuating values as under the above. The use of short cuts, tables and mechanical aids. Lectures, laboratory practice and problems. Given alternate years with course 25a.

26a. PERSONAL INSURANCE (Life and Accident) — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

The general theory and practice of life and accident insurance. History and evolution of life insurance and the modern life policy. The social functions of insurance and its importance in the business world. Development of the science of insurance explaining the different types of policy and the technical meaning of premium, reserve, dividend, surplus, expectation of life, annuities, surrender values, extentions, loans, paid up insurance etc. The personal insurance problem and its solution. Types of insurance organizations and companies. Public regulation. Lectures and assigned readings. Given alternate years with course 26b.

26b. PROPERTY INSURANCE — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

The basic theory of fire insurance. The historic development, peculiarities and practice of various forms of property insurance, including storm, boiler, marine, fire and miscellaneous. A technical study of an insurance company of each type. Critical examination of policy contracts, exemptions, forfeitures, abandonments, co-insurance, adjustments, and other questions of procedure under insurance contracts. Lectures and assigned readings. Given alternate years with course 26a.

27. COMMERCIAL CREDIT — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 22

The forms and uses of credit. Its importance in the business world and its dangers. The work of the credit man. Commercial agencies and other safeguards. Credit institutions in their relation to business. Credit in individual success and failure, in social prosperity and crises. Given alternate years with course 28.

28. ADVERTISING — MR. MITCHELL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 19.

The use of advertising in modern business. Various types of advertising and of advertising methods. Advertisement writing. Methods of following up and checking results. Examples of advertising campaigns and their results. Given alternate years with course 27.

ADVANCED AND GRADUATE COURSES

29. THEORY AND PRACTICE OF STATISTICS — MR. MITCHELL
Two credits (two hours per week) — First semester
Open to those who have completed six credits in economics.

A study of statistical method and the work of the statistician. General critical survey of present day statistical information. Correct principles of collection, tabulation, classification and interpretation of statistical material. A first hand investigation into some practical problem by the class. Lectures, assigned readings and seminary work on the special problem.

30a. HISTORY OF ECONOMIC THOUGHT — MR. ROBINSON
Two credits (two hours per week) — First semester
Open to those who have completed six credits in economics.

A survey of economic thought covering ancient, medieval and modern times, with emphasis on the period since 1850. Assigned readings, and reports on special topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

30b. METHODS OF INVESTIGATION AND INSTRUCTION IN ECONOMICS
MR. ROBINSON
Two credits (two hours per week) — Second semester
Open to those who have six credits in economics.

The scope and logical methods of economics; relation of economics to the other social sciences and to ethics; methods of carrying on investigations and of giving instruction in economics.

Assigned readings and reports on special topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

31. SEMINAR IN ECONOMICS, — MESSRS. GRAY, ROBINSON, MITCHELL, GEROULD, PHELAN AND COULTER
Six credits (three hours per week) — Both semesters

Open to graduate students and to seniors who have completed at least twelve credits in economics and are capable of making original investigations; both semesters must be completed before credit is given for the first semester.

A course in research and in methods of investigation. The course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests.

POLITICAL SCIENCE

COURSES

No.	Title	Semester	Credits	Offered to	Prerequisites
	INTRODUCTORY COURSE				
1.	Am. Govt..................	1 or 2	3	Soph., Jr., Sr.,	None
	GENERAL COURSES.				
2.	Comp. Govt.................	1	3	Jr., Sr.	course 1
3.	El. of Jurisprudence.........	1	3	Jr., Sr.	" 1
7.	Mun. Administration........	2	3	Soph., Jr., Sr.	" 8
9.	Political Parties............	1	2	Jr., Sr.	" 1 and 2
10.	*Diplomacy	2	2	Soph,. Jr., Sr.	" 1
12.	Colonial Administration.....	1	3	Jr., Sr.	" 1 and 15
15.	State and Local Admin.......	2	3	Soph., Jr., Sr.	" 1
17.	Modern Pol. Thought.......	1	2	Jr., Sr.	" 1
18.	*Comp. Fed. Govt...........	2	3	Jr., Sr.	" 1 & 2 or 12
20.	*Comp. Latin Am. Govt......	1	3	Jr., Sr.	" 1
	SPECIAL COURSES.				
6.	(Engineers) Com. Law......	1	2	Sr.	None
13.	Teacher's Govt.............	2	1	Jr., Sr.	" 1 and 2
16.	(Engineers) Am. Govt.	2	2	Jr.	None
	ADVANCED AND GRADUATE COURSES.				
4.	*Const. Law................	1, 2	6	Jr., Sr.	" 1, 2 & 8 or 17
5.	*Inter. Law..................	1, 2	6	Jr., Sr.	" 1 and 2
8.	Theory of the State.........	2	3	Jr., Sr.	" 1& 2 or 15
11.	Seminar....................	1, 2	6	Sr., Grads	" 1 and 2
14.	Adm. Law...................	2	2	Jr., Sr.	" 1 & 2 or 15
19.	*Roman Law................	1	3	Jr., Sr.	" 1 and 2

*Starred courses are not given every year.

1. AMERICAN GOVERNMENT — MESSRS. SCHAPER AND ALLIN

Three credits (three hours per week) — Each semester

Open to sophomores, juniors and seniors.

An elementary course in American Government intended as a preparation for the advanced courses in political science, for teaching in secondary schools, and for good citizenship; a study of the organization and actual workings of the national and local governments; a series of lectures on the nature and origin of the American governmental system precedes a study of the text and assigned topics; special attention will be given to important statutes on naturalization, organization of the judiciary, and of executive departments, interstate commerce, trusts, etc. Text, lectures, and special topics.

2. COMPARATIVE GOVERNMENT — MR. ALLIN

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A comparative study of the organization and working of the governments of the great European powers of today, especially of France, Germany, Great Britain, and Italy. Text, with lectures and assigned readings.

3. THE ELEMENTS OF JURISPRUDENCE — MR. SCHAPER

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A study of those human relations requiring legal regulation considered from the American point of view; the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is intended for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.

4. AMERICAN CONSTITUTIONAL LAW — MR. SCHAPER

Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1, 2, and 8 or 17; both semesters must be completed before credit is given for the first semester; given in alternate years; offered in 1909-10.

This is an advanced course in the study of the principles of our constitutional law based on important Supreme Court decisions and standard works.

5. INTERNATIONAL LAW — MR. ALLIN

Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

This course treats of the nature, sources, and sanction of international law; of the general principles as developed by positive agreement, common usage, and judicial decisions, in particular of the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. Text, lectures, and supplementary reading. Given in alternate years. Not offered in 1909-10.

6. COMMERCIAL LAW — MR. ALLIN

Two credits (two hours per week) — First semester

Intended primarily for seniors in the College of Engineering.

7. MUNICIPAL ADMINISTRATION — MR. SCHAPER

Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

A comparative study of modern city charters and methods of administration, the relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of municipal corruption and merits of proposed reforms. A text, lectures, and special topics.

8. THEORY OF THE STATE — MR. SCHAPER

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 and 2 or 15.

A study of the theory of the state, the origin, nature, purpose and justification of the state, population and territory. Leading theories, like the divine, contract, modern socialistic, individualistic, and social welfare, are considered; also the question of state interference and state management of industries. This course includes a study of classification of law, governments, and states. A text-book, with lectures and topical readings.

9. POLITICAL PARTIES — MR. SCHAPER

Two credits (two hours per week) — First semester

Open to those who have taken courses 1 and 2.

An advanced course in political parties, their origin, development, and function. Such topics as methods of making nominations, securing minority representation, the recall, the initiative and referendum are taken up. Text, lectures, and special topics.

10. DIPLOMACY — MR. ALLIN

Two credits (two hours per week) — Second semester

Open to those who have completed course 1.

The object of this course is to outline the growth of international relations, the mode of conducting foreign affairs, the relation of the treaty-making power to legislation, the duties and immunities of diplomats, the consular service, the framing, interpretation, and termination of treaties and compacts, and the character and procedure of courts of arbitration. Considerable attention will be given to concrete illustrations of the principles of international practice as exemplified in such matters as the fisheries question, the Geneva arbitration, the Caroline incident, etc. Text, lectures, and supplementary reading.

11. SEMINAR IN POLITICAL SCIENCE — MESSRS. SCHAPER AND ALLIN

Six credits (three hours per week) — Both semesters

Open to graduate students and seniors of suitable preparation.

A seminar for research in the field of political science. A feature of the seminar is the discussion of current problems in politics and administration.

12. COLONIAL ADMINISTRATION — MR. ALLIN

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 and 15. Forms with course 13 in economics a year course in colonization.

This course embraces a discussion of the principal classes of colonies, the causes of colonization, the social, economic, and political tendencies of colonial development, imperial relations, preferential trade, and independence. A study is made of the political systems of modern colonial governments, of the organization and administration of the Spanish, English, French, Dutch, German, and American colonies. Lectures, assigned readings, and special topics. Given in alternate years. Offered in 1909-10.

13. TEACHER'S COURSE IN GOVERNMENT

One credit (one hour per week) — Second semester

Open to students of suitable preparation who intend to teach American government in the secondary schools.

Lectures and the examination of text-books, maps, and other materials useful to teachers.

14. ADMINISTRATIVE LAW — MR. SCHAPER

Two credits (two hours per week) — Second semester

Open to those who have completed courses 1, 2 or 15.

A course dealing with administration as a science, its origin and development, the law of officers under the national government, the merit system, and the growth of special administrative tribunals. Text, lectures, and cases.

15. STATE AND LOCAL ADMINISTRATION — MR. SCHAPER

Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

A special course in the problems of our state and local governments; a comparative study of new experiments in legislation and administration, the workings of our courts, the jury system, and the new state police. Lectures, cases, and special topics.

16. AMERICAN GOVERNMENT

Two credits (two hours per week) — First semester

Intended for students in the college of Engineering.

17. MODERN POLITICAL THOUGHT — PROF. SCHAPER
Two credits (two hours per week) — First semester
Open to those who have taken course 1.

A study of democracy, the reform movements, the decline of individualism, the extension of the sphere of governmental activity and American political ideals and theories. Lectures, and assigned readings.

18. COMPARATIVE FEDERAL GOVERNMENT — MR. ALLIN
Three credits (three hours per week) — Second semester
Open to those who have taken courses 1 and 2 or 12.

A comparative study of ancient and modern confederations and federal unions. Special attention will be given to the description and analysis of the federal constitutions of the United States, Switzerland, Canada, Australia, and the proposals for the South African Union and Imperial federation. The nationalizing tendencies of the federal system, and the influence of political parties and commercial policies upon federal organization will be carefully considered. Lectures, reports and assigned reading. Given in alternate years. Offered in 1909-10.

*19. ROMAN LAW
Three credits (three hours per week) — First semester
Open to those who have taken courses 1. and 3.

A study of the growth of the Roman Law and its influence on the development of the Continental, English and American Law. Text and assigned reading.

*20 COMPARATIVE LATIN AMERICAN GOVERNMENTS
Three credits (three hours per week) — First semester
Open to those who have taken course 1.

A study of the governments and political conditions of Brazil, Argentine, Chile and Mexico. Text, lectures and assigned reading.

EDUCATION

GEORGE F. JAMES, Professor, Head of Department of Education
ALBERT W. RANKIN, Professor
FLETCHER H. SWIFT, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from history, philosophy, economics, politics, sciences and languages according to special aim of the individual.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Hist. of Educ. to Reformation	1	3	Jr., Sr.	None
2.	Hist. of Mod. Education.....	2	3	Jr., Sr.	1
3.	Educational Psych..........	2	3	Soph., Jr., Sr.	Philosophy 1
4.	Secondary Education.........	1	3	Jr., Sr.	1 and 2
5.	Prin. and Org. of El. Teaching	2	3	Sr.	1, 2, and Philosophy 1
6.	Prin. and Org. of Sec. Teaching..................	2	3	Jr., Sr.	1 and 2

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Theory of Education	1	3	Jr., Sr.	Philosophy 1
8.	School Administration	1	3	Sr.	1 and 2
9.	School Supervision	2	3	Sr.	See statement
10.	Comp. Study of Sch. System	2	3	Sr.	1 and 2
11.	Modern Educ. Theories	2	3	Sr.	1 and 2, and Philosophy 1
12.	Current Prob. in Elem. Teaching	1	2	Sr. Grad.	5
13.	Educational Classics	1	2	Sr.	1 and 2
14.	Current Prob. in Sec. Teaching	2	2	Sr. Grad.	6
15.	Probl. in Sch. Administration	2	2	Sr. Grad.	1 and 2
16.	School Sanitation	1	2	Sr. Grad.	None
17.	Organization of Higher Education	2	1	Sr. Grad.	1 and 2

1. HISTORY OF EDUCATION TO THE REFORMATION — MR. SWIFT

Three credits (three hours per week) — First semester

Open to juniors and seniors.

An introductory study in the history of education, conducted by means of lectures, assigned readings, discussions, and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in medieval times, the rise of the university, and of the humanistic schools of the Renaissance.

2. HISTORY OF MODERN EDUCATION — MR. SWIFT

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

3. EDUCATIONAL PSYCHOLOGY — MESSRS. MINER AND HAYNES

Three credits (three hours per week) — Second semester

Open to sophomores and juniors who have completed philosophy 1.

Identical with philosophy 3. The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. SECONDARY EDUCATION — MR. JAMES

Three credits — First semester

Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports and discussions.

5. **Principles and Organization of Elementary Teaching** — Mr. Rankin
Three credits — First semester
Open to seniors who have completed courses 1. and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions and reports. It is planned for all students who expect to teach in the high schools or to be principals or superintendents. No credit is given in this course to graduates of normal schools, who have received one year's credit at the university.

6. **Principles and Organization of Secondary Teaching** — Mr. Rankin
Three credits — Second semester
Open to seniors who have completed courses 1 and 2.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

7. **The Theory of Education** — Mr. James
Three credits — First semester
Open to juniors and seniors who have completed philosophy 1.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching. No credit is given in this course to graduates of normal schools who have received one year's credit at the university.

8. **School Administration** — Mr. Rankin
Three credits — First semester
Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports, and discussions; the organization of school systems, the work of school boards, superintendents, principals and teachers, school buildings, and hygiene. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. **School Supervision** — Mr. Rankin
Three credits — Second semester
Open to seniors; intended only for students with experience in teaching.

An advanced course treating of the duties of school principals and superintendents. Credit will not be given both for course 8 and for course 9.

10. **Comparative Study of School Systems** — Mr. James
Three credits — Second semester
Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England and the United States, with special reference to principles and methods of administration. Elementary, secondary and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports and discussions.

11. MODERN EDUCATIONAL THEORIES — MR. JAMES
Three credits — Second semester
Open to students who have completed courses 1 and 2 and philosophy 1.

12. CURRENT PROBLEMS IN ELEMENTARY TEACHING — MR. RANKIN
Two credits (two hours per week) — First semester
Open to seniors and graduate students who have completed course 5.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the stuffent under the direction of the instructor through readings, the visiting of schools, and through class discussions.

13. EDUCATIONAL CLASSICS — MR. JAMES
Two credits (two hours per week) — First semester
Open to seniors who have completed courses 1 and 2, and to graduate students.

A seminar course for the reading of selected educational classics and for detailed study of corresponding periods in educational history.

14. CURRENT PROBLEMS IN SECONDARY TEACHING — MR. RANKIN
Two credits (two hours per week) — Second semester
Open to seniors and graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching experience, who wish to pursue a theoretical and a practical study of some current problems in connection with secondary teaching. The course will be conducted by lectures, class discussions, readings, and by the visiting of schools.

15. PROBLEMS IN SCHOOL ADMINISTRATION — MR. JAMES
Two credits (two hours per week) — Second semester
Open to seniors and graduate students who have completed courses 1 and 2.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions falling within the proposed field.

16. SCHOOL SANITATION — MR. RANKIN
Two credits (two hours per week) — First semester
Open to seniors and graduate students.

This course will be conducted by text, by lectures, and by investigations into problems of school lighting, heating, ventilation, and other questions of school architecture and management connected with the physical wellbeing of the pupils.

17. ORGANIZATION OF HIGHER EDUCATION — MR. JAMES
One credit (one hour per week) — Second semester
Open to seniors and graduate students who have completed courses 1 and 2.

This course is intended for students who are interested in the general problems of educational administration and who look forward later to college teaching. It includes an historical sketch of the development of the American university, with discussions of modes of organization and administration, problems of departmental teaching, and questions of class instruction.

20. HISTORY OF RELIGIOUS EDUCATION — MR. SWIFT
One credit (one hour per week) — First semester
Open to juniors, seniors, and graduate students.

An introductory study of the development of the religious consciousness and of the aim, means, and methods of religious instruction among certain types selected from ancient and modern civilizations.

21. Principles of Religious Education — Mr. Swift
One credit (one hour per week) — Second semester
Open to juniors, seniors, and graduate students.

A study of the most important principles of education viewed from the standpoint of their relation and application to religious activities and institutions and also to the means, methods, and materials of religious instruction.

ENGLISH

Richard Burton, Professor, Head of Department of English
Frederick Klaeber, Professor
Frances Squire Potter, Professor
Joseph W. Beach, Assistant Professor
Mary Gray Peck, Assistant Professor
Eleanor Sheldon, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not counting courses 1 and 2, and including course 19 or 22.

For a Major, courses 3, 6, 7, 14, 15 and 22, together with reinforcing subjects (thirty credits) selected from comparative philology, rhetoric (courses 2, 3 and 4), advanced modern language, ancient language, philosophy, history and additional English.

For B. A. with Distinction, the general requirements (page 46), course 3 in rhetoric, and nine credits in English (six of which shall be in old English) in addition to the requirements for a major.

For a Teacher's Certificate, courses 3 (first semester), 6, 7, 14, 15, 18 and 22, six additional credits and course 2 in rhetoric.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Outline Eng. Lit.	1	3†‡	All	See statement
2.	Outline Am. Lit.	2	3‡†	All	See statement
3.	Old Eng.	1, 2	6	Soph., Jr., Sr.	None
4.	Middle Eng.	1	2	Soph., Jr., Sr.	See statement
5.	Piers the Plowman	1	2	Soph., Jr., Sr.	See statement
6.	Chaucer	1	3	Soph.	None
7.	Spenser	2	3	Soph.	None
8.a	Outline 18 Cent. Lit.	1	3	Jr., Sr.	Six credits
8b	The English Humorists	1	3	Jr., Sr.	Six credits
9.	Outline 19 Cent. Lit.	2	3	Jr., Sr.	Six credits
12.	Eng. Novel	1	3	Jr., Sr.	Six credits
13.	Bible as Lit.	2	3	Jr., Sr.	None
14.	Milton	1	3	Jr.	6 and 7, or six credits
15.	Shakespeare	2	3	Jr.	6, 7 and 14, or nine credits
16.	Mod. Drama	1, 2	6*	Sr.	15 or nine credits
18.	Teacher's Course	1, 2	2*	Sr.	6, 7, 14 and 15
19.	Hist. Lit. Crit.	1, 2	2*	Jr., Sr.	None
20.	Eng. Prose	1	3	Jr. Sr.,	Six credits

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
21.	Browning-Tennyson	2	3	Jr., Sr.	Six credits
22.	Hist. Eng. Lang	2	1	Soph., Jr., Sr.	3 (1st. sem.)
23.	Trags and Romances of Shaks.	1	3	Jr., Sr.	Six credits
24.	Sen. Seminar	1, 2	2	Sr., Grad.	See statement
25.	Anglo-Saxon	1	..	Grad.	Major in Eng.
26.	Beowulf	2	..	Grad.	Major in Eng.
27.	Shakespeare	1, 2	..	Grad.	Major in Eng.
28.	Prose Fiction	1, 2	..	Grad.	Major in Eng.
29.	Drama	1, 2	..	Grad.	Major in Eng.

‡Juniors and seniors are allowed only half credit, not credited toward a minor.

†Courses 1 and 2 must be completed before credit is allowed for either.

*Both semesters must be completed before credit is allowed for the first semester.

1. OUTLINE OF ENGLISH LITERATURE — MISS PECK AND MR. BEACH

Three credits (three hours per week) — First semester

Open to sophomores, and to freshmen who have passed, with a grade of good or excellent, part 2 of the entrance examination in English. Juniors and seniors are allowed only half credit; freshmen must also complete course 2 before credits will be allowed for this course; not credited toward a major in English.

An outline sketch of the main personalities of English literature from the earliest times to the present. The intention is to enable the student later to approach more specific aspects of the study with a general notion of the subject.

2. OUTLINE OF AMERICAN LITERATURE — MR. BURTON AND MISS PECK

Three credits (three hours per week) — Second semester

Open to freshmen who have completed course 1, and to sophomores; half credit to juniors and seniors; not credited toward a major in English.

A study of the salient figures of our native literary development. Special attention is given to contemporary writers.

3. OLD ENGLISH — MESSRS. KLAEBER AND BEACH

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors and seniors; required of all who take a major or obtain a teacher's certificate.

A study of the language and reading of representative selections of old English prose and poetry. The relation to the modern English will be particularly emphasized.

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE, MR. KLAEBER

Two credits (two hours per week) — First semester

Open to sophomores, juniors and seniors, who have taken the first semester of course 3; alternates with course 5.

An outline of middle English grammar including the interpretation of selected texts.

5. PIERS THE PLOWMAN — MR. KLAEBER

Two credits (two hours per week) — First semester

Open to sophomores, juniors and seniors, who have taken the first semester of course 3; alternates with course 4; not given in 1908–9.

A critical study of *Piers the Plowman*

6. **CHAUCER** Miss Peck, Mr. Beach and Mr. Firkins
Three credits (three hours per week) First semester
Open to sophomores.

A study of the grammar and literary forms of fourteenth century English with selected readings from Chaucer's works. Special attention is given to the *Canterbury Tales*.

7. **SPENSER** Miss Peck, Mr. Beach and Mr. Firkins
Three credits (three hours per week) Second semester
Open to sophomores.

A course in the forms and literary influences in the Elizabethan period which are illustrated in the poetry of Edmund Spenser, with selected readings from the minor poems and three books entire of the *Faery Queen*.

8a. **OUTLINE OF EIGHTEENTH CENTURY LITERATURE** Mr. Beach
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed one year of work in English.

An outline study of the main personalities and literary forms of the eighteenth century. Particular attention to Defoe, Addison and Steele, Swift, Pope, Gray, and Johnson, with a sketch of the minor poets and novelists. Reports required on the reading of representative works. Not given in 1909-10.

8b. **THE ENGLISH HUMORISTS** Mr. Beach
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed one year in English.
Courses 8a and 8b will be given in alternate years.

9. **OUTLINE OF NINETEENTH CENTURY LITERATURE** Mr. Beach
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed one year of work in English.

An outline study of the main literary forms in the nineteenth century, with some consideration of all the major writers in poetry, the novel and the essay. Reports required on the reading of representative works.

12. **THE ENGLISH NOVEL** Mrs. Potter
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed one year of work in English.
A study of the history and development of the English novel.

13. **THE BIBLE AS LITERATURE** Mrs. Potter
Three credits (three hours per week) Second semester
Open to juniors and seniors.

A literary study of the Old Testament with special attention to forms and the critical study of selected readings.

14. **MILTON** Mrs. Potter
Three credits (three hours per week) First semester

Open to juniors who have completed courses 6 and 7, or one year of work in English; courses 6 and 7 are the most suitable preparation; required of all who take their major or obtain a teacher's certificate in English.

A critical study of the early poems, six books of *Paradise Lost* and *Samson Agonistes*.

15. **SHAKESPERE**
Three credits (three hours per week) Mrs. Potter
Second semester

Open to juniors who have taken course 6, course 7, course 14 or a year and a half of English; courses 6, 7 and 14 are the most suitable preparation. Required of all who take their major or obtain a teacher's certificate in English.

An outline study of the Shakespere plays, with a critical study of selected comedies, tragedies, and historical plays.

16. CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA — MISS PECK
Six credits (three hours per week) — Both semesters

Open to seniors who have completed two years of work in English, which must include course 15.

First semester: a study of the theory of the drama, with the history of English drama to the middle of the nineteenth century. Second semester: a study of the inter-relation of the English with the continental drama in the late nineteenth century with special emphasis upon Ibsen.

18. TEACHER'S COURSE IN ENGLISH — MRS. POTTER
Two credits (one hour per week) — Both semesters

Open to seniors who have completed courses 6, 7, 14, and 15; both semesters must be completed before credit is allowed for the first semester.

A survey of English literature with emphasis on methods of interpretation and teaching in the secondary schools.

19. HISTORY OF LITERARY CRITICISM — MR. BURTON
Two credits (one hour per week) — Both semesters

Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.

This course traces the rise, growth and present condition of the principles of criticism as applied to literature.

20. ENGLISH IDIOM — MR. BURTON
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed one year of work in English.

A discussion of current idiom with the purpose of relating it to the underlying principles of historical development.

21 BROWNING AND TENNYSON — MR. BURTON
Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed one year of work in English.

This course involves a reading of the representative work of the two major poets of the Victorian era, in order to show their quality and contrasted power.

22. HISTORY OF THE ENGLISH LANGUAGE — MR. KLAEBER
One credit (one hour per week) — Second semester

Open to sophomores, juniors, and seniors who have completed the first semester of course 3; required of all who take their major or obtain a teacher's recommendation in English.

23. THE LATEST TRAGEDIES AND ROMANCES OF SHAKESPERE — MR. BURTON
Three credits (three hours per week) — First semester

Open to juniors and seniors who have gained six credits in the department.

24. SENIOR AND GRADUATE SEMINAR IN ENGLISH — MISS PECK
Two credits (one hour per week) — Both semesters

Open to seniors and graduates who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.

Hakluyt's Voyages will be studied. The work will consist of an inquiry into the vivid and dramatic sources of the language and literature found in this "prose epic" of the Elizabethan seamen.

25. **Anglo-Saxon** Mr. Klaeber
First semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

26. **Beowulf** Mr. Klaeber
Second semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

27. **Shakespere** Mrs. Potter

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

28. **The Drama as a Literary Form** Mr. Burton
Both semesters

Open in alternate years to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

29. **Fiction as a Literary Form** Mr. Burton
Both semesters

Open in alternate years to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

GEOLOGY AND MINERALOGY

Christopher W. Hall, Professor, Head of Department of Geology and Mineralogy
Edward M. Lehnerts, Assistant Professor
Frederic W. Sardeson, Assistant Professor
Frank F. Grout, Instructor
——————————, Instructor.
A. Alfred Johnson, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits.

For a Major, eighteen credits, together with reinforcing subjects (thirty credits) selected from animal biology, botany, chemistry, mathematics, physics, topographic drawing, advanced modern languages and additional geology and mineralogy.

For B. A. with Distinction, the general requirements (page 46) and six credits in addition to the requirements for a major.

For a Teacher's Certificate, the same as for a major.

COURSES

GEOLOGY

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	General Geology	1	3	Jr., Sr.	None
2.	Essentials Phys. Geog	1	3	Jr., Sr.	None
3.	Indust. Geography	2	3	Jr., Sr.	1 or 2
4.	Elements of Meteorology	2	3	Jr., Sr.	1 or 2
5.	Geog. and Geol. of Minn	2	3	Jr., Sr.	1
6.	Historical Geology	2	3	Jr., Sr.	1, 7, or 8
7.	Elements of Paleontol	1	3	Jr., Sr.	See statement
8.	Paleontology	1, 2	6	Jr., Sr.	See statement
9.	Paleontologic Practice	1, 2	6	Jr., Sr.	See statement
10.	Elements of Rock Study	1	3	Jr., Sr.	1
11.	Petrography	2	3	Jr., Sr.	10
12.	Applied Geology	1	3	Jr., Sr.	1
13.	Ore Deposits	1	3	Sr.	1
14.	Special Problems	2	2	Sr.	Geol. 1 and Min. 1
15.	Method and Material of Geog.	1, 2	2	Jr., Sr.	1 or 2
16.	Outline Study of Minerals and Rocks	1, 2	2	Sr.	None
17.	Regional Physiography	2	3	Jr., Sr.	1 or 2
18.	Climatology	1	3	Sr.	4
19.	Field and Lab. Practice	1, 2	2	Jr., Sr.	None
20.	Probs. in Indus. Geog	1	3	Sr.	
21.	Petrographical Problems	1, 2	..	Grad.	See statement
22.	Keweenawan Eruptives	1, 2	..	Grad.	See statement
23.	Glacial Geology	1, 2	..	Grad.	See statement
24.	Paleontologic Geol	...	3	Grad.	1, 6 and 8
25.	Advanced Paleontology	1, 2	6	Grad.	8

MINERALOGY

1.	Elements of Mineralogy	1	3	Soph., Jr., Sr.	None
2.	Descriptive Mineralogy	1, 2	6	Soph., Jr., Sr.	None
3.	Quantitative Mineralogy	2	3	Soph., Jr., Sr.	1
4.	Optical Mineralogy.	2	3	Sr.	1
5.	Morphology of Minerals	1	3	Jr., Sr.	
6.	Physico-Chem. Methods	2	3	Sr.	
7.	Outline of Mineralogy	1, 2	2	Jr., Sr.	None
8.	Original Problems	1, 2	..	Grad.	See statement
9.	Special Investigations	...	..	Grad.	See statement
10.	Occurrences and Association.	1, 2	..	Grad.	See statement

GEOLOGY

Students who desire to take double courses in geology may do so be electing any of the following combinations: First semester, 1 and 2, 1 and 7, 1 and 10, 6 and 8, 8 and 9, 10 and 12; second semester, 3 and 4, 3 and 5, 5 and 6, 8 and 9, 6 and 11. By vote of the faculty, credit will be given to students who satisfactorily complete any of the general field courses in geology offered in the joint announcement of various universities for the summer of 1909.

1. **GENERAL GEOLOGY** — MR. HALL
Three credits (three hours per week) — First semester
Open to juniors and seniors.

Comprises: (1) geodynamics, in which are set forth the energies and phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles, and lantern-slides.

2. **ESSENTIALS OF PHYSICAL GEOGRAPHY** — MR. LEHNERTS
Three credits (three hours per week) — First semester
Open to juniors and seniors.

Discussions of the principles of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.

3. **INDUSTRIAL GEOGRAPHY** — MR. LEHNERTS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or 2.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of the geographic causes of local industries effected through excursions and reports. A brief survey of the geography of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. **ELEMENTS OF METEOROLOGY** — MR. LEHNERTS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or 2.

The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-book, lectures, and reference reading.

5. **GEOGRAPHY AND GEOLOGY OF MINNESOTA** — MR. HALL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

(a) The physical geography of the state in its relations to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the state and the extension of these into general application. (c) The present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

6. **HISTORICAL GEOLOGY** — MR. SARDESON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1, 7 or 8.

A course in historical geology, including a study of the more important types of fossils in their geological relations. The history of the North American continent in particular is considered. Lectures and demonstrations.

7. ELEMENTS OF PALEONTOLOGY — MR. SARDESON

Three credits (three hours per week) — First semester

Open to juniors and seniors who have taken courses in geology or biology.

This course includes an elementary study of fossil organisms and a discussion of the sources and interpretation of paleontologic evidence and the relation to it of theories of evolution. Lectures and demonstrations. Occasional excursions will be arranged.

8. PALEONTOLOGY — MR. SARDESON

Six credits (three hours per week) — Both semesters

Open to juniors and seniors who have taken or are taking courses in geology or biology.

The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations.

9. PALEONTOLOGIC PRACTICE — MR. SARDESON

Six credits (three hours per week) — Both semesters

Open to juniors and seniors who have completed course 8; may be taken by students pursuing courses in geology and biology in conjunction with course 7.

The collection, preparation, and study of materials, examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course 7.

10. ELEMENTS OF ROCK STUDY — MR. GROUT

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

The structures, textures, and mineral and chemical composition of rocks. A practical study of rock types with laboratory and field practice. The origin, occurrence, variation, and alteration of rocks are considered with a view to their accurate description. An introduction to the use of the microscope concludes the course. Text book, reference reading, and practice.

11. PETROGRAPHY — MR. GROUT

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 10.

The identification of rocks through the optical study of the component minerals, rock structures as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field, and an examination of some group of Minnesota crystalline rocks are features of the course. Laboratory, lectures, reference reading, and field work.

12. APPLIED GEOLOGY — MR. GROUT

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic value, including coal, mineral oil, and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief summary of the nature and distribution of ore deposits. Textbook and reference reading.

13. ORE DEPOSITS — MR. HALL

Three credits (three hours per week) — First semester

Open to seniors who have completed geology 1 and mineralogy 1.

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead, and zinc.

14. SPECIAL PROBLEMS — MR. HALL

Two credits (two hours per week) — Second semester

Open to seniors who have completed courses 1 and 13.

The investigation by individual students of particular problems, involving the field work of an investigation of some particular formation and the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books, and the preparation of geological maps, profiles, and sections will be taught.

15. THE METHOD AND MATERIAL OF GEOGRAPHY — MR. LEHNERTS

Two credits (one hour per week) — Both semesters

Open to juniors and seniors; designed espcially for teachers.

The earth as an object of study in the grades and in the high school; guiding principles; the course of study; text-books and their use; practical laboratory work; excursions; collection and preparation of illustrative materials; map drawing, chalk modeling, and relief work; organization of geographical subject matter for class-room instruction; and the method of the recitation.

16. OUTLINE STUDY OF MINERALS AND ROCKS — MESSRS. HALL AND GROUT

Two credits (one hour per week) — Both semesters

Open to seniors; designed specially for teachers.

This course treats of the leading physiographic facts and principles; the macroscopic characters of the common rocks and a discussion of the general principles of petrographical and stratigraphical geology. Lectures and reading, supplemented by excursions and practical problems.

17. REGIONAL PHYSIOGRAPHY — MR. LEHNERTS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1 or 2.

An application of the principles of physical geography in a study of the continents and their physiographic provinces; the origin and geographic significance of their physical features; and the influence of these on the early settlement of countries and the subsequent industrial and political development of nations.

18. CLIMATOLOGY — MR. LEHNERTS

Three credits (three hours per week) — First semester

Open to seniors who have completed course 4.

An application of the principles of meteorology to a study of the climates of the world and the factors on which these climates depend; climatic influences on the distribution and characteristics of plants and animals, and on man's needs and occupations. Lectures, recitations and reference reading.

19. FIELD AND LABORATORY PRACTICE — MESSRS. HALL AND LEHNERTS

Two credits (one hour per week) — Both semesters

Open to juniors and seniors; designed specially for teachers.

A study of the geography and geology of Minneapolis, St. Paul, and adjacent territory, embracing the salient physiographic, stratigraphic, and economic features of this interesting region. Relief, topography, and map work will receive attention in the laboratory as well as in the field. For teachers and others who wish to learn the methods of field geography and geology.

20 **Problems in Industrial Geography** **Mr. Lehnerts**
Three credits (three hours per week) First semester
Open to seniors who have completed course 3.

The effects of coast-lines and harbors, navigable rivers, water powers, mountains and plains, rock formations and soils, ground and surface waters for municipal and farm supplies, upon the utilization and conservation of natural resources and mineral wealth. A series of special problems in Geography.

21. **Petrographical Problems** **Messrs. Hall and Grout**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbro schists of the Minnesota river valley or the granites and basic eruptives of central Minnesota.

22. **The Keweenawan Eruptives** **Messrs. Hall and Grout**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

This course treats first, eastern and northwestern Minnesota, their stratigraphic relations, textural and structural characters; second, other problems in the Keweenawan to be selected on consultation.

23. **Glacial Geology** **Mr. Hall**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of Saint Anthony, the Dalles of the Saint Croix, and other problems. The special field to be selected on consultation.

24. **Paleontologic Geology** **Mr. Sardeson**
Three credits (three hours per week)
Open to graduate students who have completed courses 1, 6, and 8.

A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.

25. **Advanced Paleontology** **Mr. Sardeson**
Six credits (three hours per week) Both semesters
Open to graduate students who have completed course 8.

A study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The class work is to be supplemented by a thesis.

MINERALOGY

1. **Elements of Mineralogy** **Messrs. Hall and Grout**
Three credits (six hours per week) First semester
Open to sophomores, juniors, and seniors; the laboratory fee is three dollars

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and of economic minerals; the basis of classification. (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

2. DESCRIPTIVE MINERALOGY — MESSRS. HALL AND GROUT
Three credits (six hours per week) — Second semester

Open to sophomores, juniors, and seniors; the laboratory fee is three dollars.

(a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal-axes. Theses. (b) Laboratory work; includes quantitative blowpipe analysis, crystal measurement, the sight determination of minerals, and reference reading.

3. QUANTITATIVE MINERALOGY — MESSRS. APPLEBY AND CHRISTIANSON
(In the School of Mines)
Three credits (six hours per week) — Second semester

Open to sophomores, juniors, and seniors, who have completed course 1; the laboratory fee is five dollars.

Determination of the values of ores. Lectures, recitations, and laboratory work. Identical with metallurgy 1 in the School of Mines.

4. OPTICAL MINERALOGY — MR. GROUT
Three credits (six hours per week) — Second semester

Open to juniors and seniors who have completed course 1 in Mineralogy.

A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

5. THE MORPHOLOGY OF MINERALS — MR. GROUT
Three credits (three hours per week) — First semester

Open to juniors and seniors.

A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.

6. PHYSICO-CHEMICAL METHODS WITH THEIR APPLICATIONS — MR. GROUT
Three credits (three hours per week) — Second semester

Open to seniors.

The methods of micro-chemical analysis are described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.

7. AN OUTLINE OF MINERALOGY — MR. GROUT
Two credits (one hour per week) — Both semesters

Open to juniors and seniors.

A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.

8. ORIGINAL PROBLEMS IN MORPHOLOGICAL AND PHYSICAL MINERALOGY
MESSRS. HALL AND GROUT
Both semesters

Open to graduate students; individual arrangements may be ascertained upon application to the department.

Investigations in mathematical crystallography and its applications to crystal development and structure. Further applications than are made in course 4 of the optical characters of minerals in identification of mineral species.

9. SPECIAL INVESTIGATIONS IN CHEMICAL AND PHYSICAL MINERALOGY MR. GROUT

Open to graduate students; other arrangements may be ascertained upon application to the department.

Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage, and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.

10. MINERAL OCCURRENCES AND ASSOCIATION MESSRS. HALL AND GROUT
Both semesters

Open to graduate students; individual arrangements may be ascertained upon application to the department.

A discussion of genetic relationships. Field work in connection with different phases of the particular problem in hand.

GERMAN

JOHN G. MOORE, Professor, Head of Department of German
CARL SCHLENKER, Professor
HANS JUERGENSEN, Assistant Professor
OSCAR BURKHARD, Assistant Professor
MATILDA J. WILKIN, Assistant Professor
RICHARD WISCHKAEMPER, Instructor
ALFRED E. KOENIG, Assistant
JAMES DAVIES, Assistant
LEON METZINGER, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including course 1.

FOR A MAJOR, eighteen credits, not including course 1, together with reinforcing subjects (thirty credits) selected from philology, Anglo-Saxon and old English, Icelandic, advanced Scandinavian, advanced English, Latin, Greek, and additional German.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and courses 8, 9 and 10 and any two of courses 12, 13, 14 and 17.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 2 or 4, 6 or 7, 8, 9, 10 and 11.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1a.	Beginning..................	1, 2	10*‡	All	None
1b.	Beginning..................	1, 2	6*‡	Engineers	None
2.	Intermediate................	1, 2	6*	Soph., Jr., Sr.	1
3a.	Scientific Intermediate......	1, 2	6*	Soph., Jr., Sr.	1
3b.	Scientific Intermediate......	1, 2	6*	Soph. Eng.	1b

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
4.	Prose and Poetry	1, 2	6*	All	Two yrs. prep. Ger.
5.	Conversation	1, 2	4*	All	See statement
6.	Drama	1, 2	6*	Soph., Jr., Sr.	1 and 2, or 4
7.	Adv. Sc. Reading	1, 2	6*	Soph., Jr., Sr.	2 or 3 or 4
8.	Adv. Conversation	1, 2	4*	Soph., Jr., Sr.	See statement
9.	Classic Period	1, 2	6*	Jr., Sr.	See statement
10.	Modern Authors	1, 2	6*	Jr., Sr.	9
11.	Teacher's Course	2	1	Sr.	9
12.	Reformation	1, 2	4*	Sr. Grad	9 or 10
13.	Middle High Ger	1, 2	4*	Sr. Grad.	9 or 10
14.	Old High Ger	1, 2	4*	Sr.	9 or 10
15.	Seminar on Drama	1, 2	..	Grad.	See statement
16.	Volkslied	1, 2	2*	Grad.	9 or 10
17.	Hist. of Ger. Lit	1, 2	4*	Sr. Grad.	9
18.	Sem. on Reading	1, 2	4*	Grad.	See statement

‡Juniors and seniors are allowed only half credit.

*Both semesters must be completed before credit is allowed for the first semester.

1a. BEGINNING — MR. SCHLENKER AND MRS. WILKIN, MESSRS. JUERGENSEN, WISCHKAEMPER AND EICHHOLSER

Ten credits (five hours per week) — Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

1b. BEGINNING — MR. BURKHARD

(In the College of Engineering.)

Six credits (three hours per week) — Both semesters

Open to engineering students only.

2. INTERMEDIATE — MESSRS. SCHLENKER, EICHHOLSER, WISCHKAEMPER AND MISS STAMM

Six credits (three hours per week) — Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5. It should be followed by course 6 or course 7. Students who obtain credit for this course cannot receive credit also for either course 3 or course 4.

First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe, or Schiller.

3a. SCIENTIFIC INTERMEDIATE — MESSRS. JUERGENSEN AND WISCHKAEMPER

Six credits (three hours per week) — Both semesters

Open to all who have completed course 1. Not open to those who have obtained credit for course 2 or course 3b. Both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5.

Wait's German Science Reader (or equivalent). The course aims to give the student a reading knowledge of German for use in scientific studies.

3b. SCIENTIFIC INTERMEDIATE — MR. BURKHARD

(In the College of Engineering.)

Six credits (three hours per week) — Both semesters

Open only to students in College of Engineering who have completed course 1a or course 1b. Not open to those who have credit for course 2 or course 3a.

Merchel, Bilder aus der Ingenieurtechnik. This course is arranged to meet the peculiar needs of engineering students.

4. PROSE AND POETRY MR. MOORE, MRS. WILKIN, MESSRS. BURKHARD, WISCHKAEMPER AND MISS STAMM

Six credits (three hours per week) Both semesters

Open to all who enter the University with two years of German; not open to those who have obtained credit in course 2 or course 3; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5.

Meissner's *Aus deutschen Landen*; *Goethe's Gedichte*. Heine's *Buch der Leider*. Geography, history and legend. Review of German grammer throughout the year.

5. ELEMENTARY CONVERSATION AND COMPOSITION MRS. WILKIN, MESSRS. JUERGESEN, BURKHARD, WISCHKAEMPER AND EICHHOLZER

Four credits (two hours per week) Both semesters

Open to those who are taking or have taken course 2 or 3, or 4; no credit to those who are taking, or have taken course 9 or course 10; both semesters must be completed before credit is given for the first semester.

Translation of short English selections; conversation on topics of everyday life; narrative and descriptive essays and letter writing.

6. THE DRAMA MR. SCHLENKER, MRS. WILKIN, MESSRS. JUERGENSEN AND BURKHARD

Six credits (three hours per week) Both semesters

Open to those who have taken courses 1 and 2, or course 4; both semesters must be completed before credit is given for first semester. This course may be supplemented by course 8.

First semester: Modern drama. Play of Hebbel, Hauptmann, or Sudermann. Study of the present-day drama in Germany. Assigned readings and reports. Second semestes: Classic drama. Play of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

7. ADVANCED SCIENTIFIC READING MR. JUERGENSEN

Six credits (three hours per week) Both semesters

Open to those who have taken course 2 or 3, or 4: not open to those who have credit for course 6; this course may be supplemented by course 8; both semesters must be completed before credit is given for the first semester.

Reading of monographs and periodicals.

8. ADVANCED CONVERSATION, GRAMMAR, AND COMPOSITION MR. SCHLENKER, MRS. WILKIN AND MR. BURKHARD

Four credits (two hours per week) Both semesters

Open to those who are taking or have taken course 6, 7 or 9; both semesters must be completed before credit is given for first semester; recommended that it be preceded by course 5; required of those who obtain a teacher's recommendation in German; intended as a preparation for course 11.

Essays on assigned subjects; oral exercises in German by means of discussions on everyday subjects; debates, narration, and the like.

9. GERMAN LITERATURE OF THE CLASSIC PERIOD MR. MOORE

Six credits (three hours per week) Both semesters

Open to those who have completed courses 1 and 2 (by special permission) or 3 and 7. or 4 and 6; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Goethe's *Faust:* its genesis; the Faust legend; its treatment in literature before and since Goethe's time; plan of Goethe's *Faust:* solution of the Faust problem in Part II. Second. semester: Schiller's ballads and other representative poems of his period. German versification. Reading and discussion of Lessing's more important critiques, the *Laocoon* and *Dramaturgie*. Lectures and collateral reading; essays by the class.

10. MODERN AUTHORS MR. MOORE
Six credits (three hours per week) Both semesters

Open to those who have completed courses 1, 2, and 9 (by special permission), or 4, 6, and 9, or 3, 7, and 9; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Romantic school and *Junge Deutschland*. Second semester: German literature since 1848.

11. TEACHER'S COURSE MR. MOORE
One credit (one hour per week) Second semester

Open to those who have completed course 10; especially designed for students who expect to become teachers of German in high schools.

12. HISTORY AND LITERATURE OF THE REFORMATION MR. MOORE
Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given the first semester.

Brandt, Luther, Hutten, Sachs, Murner, and Fischart. Selections from Jansen and Egelhaaf.

13. MIDDLE HIGH GERMAN MR. SCHLENKER
Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.

Study of the language and literature of the period. Paul's *Mittelhochdeutsche Grammatik*. Selected readings from *Armer Heinrich*, *Nibelungen Lied*, *Gudrun*, the poems of Walter von der Vogelweide, *Parsifal*, etc.

14. OLD HIGH GERMAN MR. KLAEBER
Four credits (two hours per week) Both semesters

Open to seniors who have taken course 9; both semesters must be completed before credit is given for the first semester.

This course is identical with comparative philology, course 11.

15. SEMINAR IN GERMAN DRAMA MR. SCHLENKER
Two credits (one hour per week) Both semesters

Open to graduates and, by permission of the department, to undergraduates but without credit.

An outline of the history of the German dramatic literature from its beginning to and including the so-called classic drama. Assigned readings, reports, and discussions.

16. THE GERMAN VOLKSLIED MR. WILLIAMS
Two credits (two hours per week) Both semesters

Open to graduate students who have completed course 9.

Outline of the history and development of the *Volkslied*. Study of selected numbers in Uhland's *Volkslieder* with references to other general and special collections. Influence of the *Volkslied* upon lyric and ballad writers.

17. HISTORY OF GERMAN LITERATURE — MR. JUERGENSEN
Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.

Lectures in German on the history of German literature. Reviews and topical research on the part of the students.

18. SEMINAR IN SCIENTIFIC READING — MR. JUERGENSEN
Four credits (two hours per week) — Both semesters

Open to graduate students who have completed course 9 or 10, and (by permission of the department) to undergraduates who have completed course 7 or 9; both semesters must be completed before credit is given for the first semester.

1909-10 The literature of evolution (Haeckel, Reinke, et al.)
1910-11 Psychology and philosophy (Wundt, et al.)

For courses in Germanic philology see the statement of the department of comparative philology, pp. 52-53.

GREEK

JOHN CORRIN HUTCHINSON, Professor, Head of Department of Greek.
CHARLES ALBERT SAVAGE, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from Latin, advanced German and French, philology, English, advanced rhetoric, ancient history and additional Greek.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and at least courses 4, 5, 6, 7, 8 or 9, 10 and two hours per week of seminar work throughout one year.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	First Year Greek	1, 2	10*	All	None
2.	History and Epic Poetry	1, 2	6*	Soph., Jr., Sr.	1
3.	Historical Prose	1, 2	6*	All	See statement
4.	Oratory	1	3	Soph., Jr., Sr.	2 or 3
5.	Philosophy	2	3	Soph., Jr., Sr.	2 or 3
6.	Lyrics	1	3	Jr., Sr.	4 or 5
7.	Tragedy	2	3	Jr., Sr.	5
8.	Philosophy (Advanced)	1	3	Jr., Sr.	5
9.	Oratory (Advanced)	1	3	Jr., Sr.	4
10.	Epic Poetry (Advanced)	2	3	Jr., Sr.	7
11.	Archaeology	1, 2	6	Jr., Sr.	None
12.	Dramatic Poetry	1, 2	4	Soph., Jr., Sr.	See statement
13.	Composition	1, 2	2*	Jr., Sr.	4 and 5
14.	Greek Literature and Life	2	2	Jr., Sr.	None
15.	Greek Mythology	1, 2	2	Jr., Sr.	None
16.	Later Greek	1, 2	6	Jr., Sr.	5

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
17.	Seminar....................	1	1	Jr., Sr.	4 or 5
18.	Seminar....................	1	1	Jr., Sr.	5
29.	Epic Poetry (Advanced).....	...	..	Grad.	
20.	Dramatic Poetry (Advanced)	...	..	Grad.	
21.	Oratory (Advanced)........	...	..	Grad.	
22.	Later Greek................	...	..	Grad.	

*Both semesters must be completed before credit is allowed for the first semester.

1. FIRST YEAR IN GREEK — MR. HUTCHINSON

Ten credits (five hours per week) — Both semesters

Open to all; both semesters must be completed before credit is given for the first semester. Students are advised to take this course in their freshman year, especially such as intend to fit themselves for teaching Latin. Those also who expect to do intensive work in ancient history or philosophy, or who expect to study theology, or who intend to devote themselves to literature, should take this course in the freshman year.

The work of the first semester is based upon Brook's *Introduction to Attic Greek*, and has for its object the mastery of the declensions and conjugations, and the simpler rules of syntax, together with the ability to read readily simple sentences based on the vocabulary of the first chapter of the *Anabasis*, which is learned by heart, and to translate into Greek idiomatic English sentences based upon the same text.

In the second semester the *Anabasis* itself is used as the reading book; an amount equivalent to about a book and a half is read. Hadley's *Greek Grammar* is studied systematically. Etymology is reviewed and syntax is studied sufficiently to enable the student to proceed confidently in the translation of the text. The translation from English into Greek is continued.

2. HISTORY AND EPIC POETRY: *Anabasis* and *Iliad* — MR. SAVAGE

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors, who have completed course 1; credits allowed only when both semesters are taken. The course is designed for students who have begun Greek in the University. Students who have begun Greek before coming to the University may, with the consent of the department, take Homer during the second semester.

Books 2, 3, and 4 of Xenophon's *Anabasis* are read during the first semester; particular attention is given to syntax and irregular verbs. Selections from Homer's *Iliad* are read during the second semester; special attention is given to prosody, and to poetical forms and usages.

3. HISTORICAL PROSE; Xenophon and Herodotus — MR. SAVAGE

Six credits (three hours per week) — Both semesters

Open to freshmen, sophomores, juniors, and seniors, who offer two years of Greek for admission to the University, or have completed course 1, and in the judgment of the department are qualified for the work; both semesters must be completed before credit is allowed for the first semester.

Selections from Xenophon's *Cyropaedia* are read during the first semester, and special attention is given to syntax and irregular verbs. Selections from Herodotus are read during the second semester, and particular attention is paid to peculiarities of dialect and style. The work is supplemented by lectures on Greek historiography.

4. ORATORY: Lysias and Demosthenes — MR. SAVAGE
Three credits (three hours per week) — Second semester
Open to those who have completed course 2 or course 3.

The course consists chiefly of readings from the orations of Lysias and Demosthenes; selections from Isocrates may also be read. This work is supplemented by lectures on Greek oratory. At this stage of the student's development less attention is given to syntax, and more attention is paid to matters of literary interest.

5. PHILOSOPHY: Plato's *Apology*, and Xenophon's *Memorabilia* — MR. SAVAGE
Three credits (three hours per week) — First semester
Open to those who have completed course 2 or course 3.

The course consists chiefly in the reading of Plato's *Apology*, together with selections from Xenophon's *Memorabilia*. The reading of texts is supplemented by lectures on Greek philosophy.

6. LYRICS — MR. BROOKS
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 4 or course 5.

7. TRAGEDY; Aeschylus and Sophocles — MR. BROOKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 5.

8. PHILOSOPHY (Advanced): Plato's *Republic* — MR. HUTCHINSON
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 5; alternates with course 9; not offered in 1909-10.

The Republic of Plato is read, not primarily for its philosophic interest but as one of the masterpieces of Greek literature. The study is, therefore, in the main, a study of literary style.

9. ORATORY (Advanced): Demosthenes' *De Corona* — MR. HUTCHINSON
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 4.

This course is intended to secure a careful study of the development of oratorical style among the Greeks, and its culmination in this acknowledged masterpiece.

10. EPIC POETRY (Advanced): The *Odyssey* — MR. HUTCHINSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 7.

The object of this course is to secure as intimate an acquaintance as possible, at first hand, with Homer. The Homeric Question is given but scanty attention; its place is in the graduate work (course 19.) Literary values receive chief attention and that these may be realized by the student as much of the text is read as is consistent with careful work.

11. ARCHAEOLOGY — MR. BROOKS
Six credits (three hours per week) — Both semesters
Open to juniors and seniors; a knowledge of the Greek language is not required.

A study of the monuments or remains of Greek art, illustrating Greek customs, civilization, and life. Laboratory methods and theses are largely employed.

12. DRAMATIC POETRY: Euripides and Aristophanes — MR. SAVAGE
Four credits (two hours per week) — Both semesters

Open in the first semester to those who have completed course 2 or 3, and in the second to those who have completed the first semester of course 7.

During the first semester, either the *Alcestis* or the *Medea* of Euripides is read; during the second semester the *Frogs of* Aristophanes is studied. Special attention is given to metre, literary style, and mythology, and the work is supplemented by lectures on the authors studied.

13. GREEK COMPOSITION MR. HUTCHINSON
Two credits (one hour per week) Both semesters

Open to juniors and seniors who have completed courses 4 and 5. Both semesters must be completed before credit is given for the first semester; recommended to those who expect to teach Greek.

The course consists of a systematic review of Greek syntax and the retranslation into Greek of passages translated from various classic authors, illustrative of various styles.

14. GREEK LITERATURE AND LIFE MR. SAVAGE
Two credits (two hours per week) Second semester

Open to juniors and seniors; a knowledge of Greek is not required. This course may not be counted toward a major or a minor.

The course is intended primarily for students who have not had an opportunity to study Greek. It consists of lectures, text book work, and illustrative readings; and, from time to time, special lectures illustrated by stereopticon views will be given. The course is especially recommended to students who are intending to teach Greek, Latin, English, or ancient history.

15. GREEK MYTHOLOGY MR. SAVAGE
Two credits (one hour per week) Both semesters

Open to seniors and juniors; no knowledge of Greek is required. This course will not be counted toward a major or a minor.

The course will consist chiefly of lectures, which will be supplemented by assigned readings, and by occasional stereopticon illustrations. The course is recommended particularly to students who are specializing in languages or philosophy.

16. LATER GREEK MR. HUTCHINSON
Six credits (three hours per week) Both semesters

Open to juniors and seniors who have completed course 5.

The course consists chiefly of selected readings from the Septuagint and the New Testament. Credit will be given for either half of the course.

17. SEMINAR IN ORATORY OR PHILOSOPHY MR. HUTCHINSON
One credit (one hour per week) First semester

Open to juniors and seniors who have completed course 4 or course 5.

In 1909-10 the work will be in connection with Demosthenes *De Corona*.

18. SEMINAR IN GREEK TRAGEDY MR. BROOKS
One credit (one hour per week) Second semester

Open to juniors and seniors who have completed course 5.

19. ADVANCED COURSE IN EPIC POETRY MR. HUTCHINSON

Open to graduate students only.*

20. ADVANCED COURSE IN GREEK DRAMATIC POETRY MR. BROOKS

Open to graduate students only.*

21. **ADVANCED COURSE IN GREEK ORATORY** **MR. SAVAGE**
Open to graduate students only.*

22. **LATER GREEK (322 B. C. to 200 A. D.)** **MR. HUTCHINSON**
Open to graduate students only.*

*For further information students are requested to confer with the professor in charge of the subject.

HISTORY

WILLIS M. WEST, Professor, Head of Department of History
FRANK M. ANDERSON, Professor
ALBERT B. WHITE, Professor
WILLIAM STEARNS DAVIS, Professor
WALLACE NOTESTEIN, Instructor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including course 1.

FOR A MAJOR, eighteen credits, not including course 1, together with reinforcing subjects (thirty credits) selected from economics and political science, sociology, biological sciences, languages according to individual needs, and additional history.

FOR A B. A. WITH DISTINCTION, the general requirements (page), thirty-six credits in history (nine of which shall be in "intensive courses") and at least twelve credits in economics, political science, sociology and anthropology.

FOR A TEACHER'S CERTIFICATE, twenty-four credits, including 4 or 5, 16, and at least six credits in "intensive courses'', At least the elements of the other social sciences are recommended.

The department of Economics and Political Science, History, and Sociology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one the departments of the social science group ought to be familiar at least with the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others. To students who are interested in the work of these departments, but who do not care to elect their major before the end of the sophomore year, the departments unite in the following recommendations for the freshman and sophomore years:

RECOMMENDATIONS FOR FRESMAN AND SOPHOMORES

1. The student should take the elementary work of each department within the group as early as possible. Accordingly the following courses are recommended:

Freshman year: history 2 (English constitutional); sophomore year: history 5 (American); economics 1, first or second semester; political science 1, first or second semester.

2. The student is advised to take in these years his required minor in science from the departments of Botany or Animal Biology, and his required minor in language from the French or German, unless he has a reading knowledge of both these languages at entrance.

Courses

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Europe 31 B.C.-1500 A.D.	1, 2	6†	All	None
2.	English Constitution	1, 2	6	All	Two yrs.prep hist
3.	Renaissance and Reform	1	3	Soph., Jr., Sr.	1 or 2
4.	Europe since 1789	1, 2	6	Soph., Jr., Sr.	1 or 2
5.	American to 1840	1, 2	6	Soph., Jr., Sr.	2
6.	American since 1840	1	3	Jr., Sr.	5
7.	Making of Constitution	1, 2	6*	Jr., Sr., Grad.	See statement
8.	American Constit'l Law	1, 2	6*	Sr., Grad.	6
9.	American Statesmen	2	3	Jr., Sr., Grad.	5
10.	Historical Masterpieces	1	3	Jr., Sr., Grad.	See statement
11.	American Diplomacy	1	3	Jr., Sr., Grad..	5
12.	Europe Diplomacy	2	3	Jr., Sr., Grad.	4
13.	Colonial Expansion	2	3	Jr., Sr., Grad.	4 or 5
14.	Authorities for N. E.	1, 2	4*	Sr., Grad.	See statement
15.	Hitorical Method	2	2	Soph., Jr., Sr.	1 or 2
16.	Teacher's Course	2	1	Sr., Grad.	See statement
17.	English Parliament	2	3	Jr., Sr., Grad.	2 and six credits
18.	English Judiciary	2	3	Jr., Sr., Grad.	2 and six credits
19.	Eng. Institutions 17th Cent.	2	3	Jr., Sr., Grad.	2 and six credits
20.	England Since 1815	1	3	Soph., Jr., Sr. Grad.	2
21.	History of Greece	1	3	Soph., Jr., Sr.	1 or 2
22.	Greek Political Inst's	2	3	Jr., Sr., Grad.	See statement
23.	Roman Imp. Organization	2	3	Jr., Sr., Grad.	Twelve credits

†Juniors and seniors receive only half credit; not counted toward a minor in history.

*Both semesters must be completed before credit is given for the first semester.

INTRODUCTORY COURSES

Freshmen who have taken two years of history in the preparatory school may omit course 1 and begin with course 2. Course 1 admits directly to courses 2, 3, 4, 15, and 21. Course 2 is required as a prerequisite for all courses in American history (5 to 9 inclusive, 11, 13 and 14) and for courses 17 to 20 in English history, while it admits also to 3, 4 and 15. Students who intend to specialize in history or in any social science should elect course 2 in the freshman year.

1. EUROPEAN HISTORY FROM THE ESTABLISHMENT OF THE ROMAN EMPIRE TO THE REFORMATION. 31 B. C.-1500 A. D. MR. DAVIS

Six credits (three hours per week) Both semesters.

Open to all, but juniors and seniors receive only half credit; especially designed for freshmen who have had less than two years of history in the preparatory school; not credited toward a minor in history.

The course will show how modern institutions are largely derived from Roman imperial institutions. The leading topics will be the gathering up of the contributions of the older world by Rome, the imperial organization of the first "political people" the Germanic invasions, the growth of the Frankish state and Charlemagne's premature attempt at organization, the medieval church, the feudal system, the crusades, the rise of the towns, and the development of modern nations. This last topic will be studied mainly as it is illustrated in the history of Germany and of France from 814 to 1500. A definite portion of the course (about one-third) will go to the careful use of source material.

2. ENGLISH CONSTITUTIONAL HISTORY TO THE ACCESSION OF GEORGE I
MR. WHITE AND MR. NOTESTEIN
Six credits (three hours per week) Both semesters.

Open to all who have had two years of history in the preparatory school or who have completed course 1.

While the general narrative of English history is not neglected, the making and testing of the English government are the main themes of the course. Much time is spent upon the study of documents which illustrate the origin and development of important institutions.

GENERAL COURSES

3. THE RENAISSANCE AND REFORMATION MR. WHITE
Three credits (three hours per week) First semester

Open to those who have completed course 1 or course 2.

The Renaissance and Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. EUROPE SINCE 1789 MR. ANDERSON
Six credits (three hours per week) Both semesters

Open to those who have completed course 1 or course 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states. The entire class meets twice each week for lectures or reciations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions and other select Documents Illustrative of the History of France* 1789-1901. This work is done in small groups which meet in the European history seminar room.

5. AMERICAN CONSTITUTIONAL HISTORY TO 1840 MR. WEST
Six credits (three hours per week) Both semesters

Open to those who have completed course 2; required for courses 6 to 9 inclusive 11, 13, 14, and 19, and therefore to students who intend to specialize in history recommended for the sophomore year.

The aim is to make this a "practice course"; the work is done partly by cooperative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

15. HISTORICAL METHOD AND BIBLIOGRAPHY MR. WHITE
Two credits (two hours per week) Second semester

Open to those who have completed course 1 or course 2, but designed only for those who intend to specialize in history.

This course aims to make clear to the student the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.
2. History of historical writings:especially the work of Ranke and his followers

and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.

3. Bibliography. Purpose, to gain a working knowledge of existing helps to historical study, such as standard bibliographies, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

16. TEACHER'S COURSE — MR. WEST

One credit (one hour per week) — Second semester

Open to seniors and graduates who have, including courses in progress, twenty-four credits in history; required for those who obtain a teacher's recommendation in history.

This course is designed to assist those who expect to teach history in high schools. Professor West will be aided by other members of the department.

20. ENGLAND SINCE 1815 — MR. ANDERSON

Three credits (three hours per week) — Second semester

Open to those who have completed course 2; may be taken to advantage in connection with course 4.

The course opens with a rapid survey from the point where course 1 stops down to 1815. From there on the work is more intensive. Through topics and assigned readings an opportunity is afforded to become acquainted with the principal British reviews and with two or three of the leading British newspapers.

21. HISTORY OF GREECE — MR. DAVIS

Three credits (three hours per week) — First semester

Open to those who have completed course 1 or course 2.

The course is general in its nature and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire, with particular emphasis upon the later part of the period. Especial attention will be given to the permanent influence of Greek civilization.

ADVANCED OR INTENSIVE COURSES

6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885 — MR. ANDERSON

Three credits (three hours per week) — First semester

Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-09, and in alternate years thereafter.

Special attention is given to the development of the slavery issue in politics, the political history of the civil war, and reconstruction.

7. THE MAKING OF THE CONSTITUTION — MR. WEST

Six credits (three hours per week) — Both semesters

Open to juniors, seniors, and graduates who have completed course 5, but only on approval of the instructor; both semesters must be completed before credit is given for the first semester.

Each member of the class studies in detail the transition in one of the original American colonies to commonwealth government, with the constitution of his chosen state. The work of the Philadelphia convention is then taken up and the accounts of later writers are compared with the sources. "We the people," the "compact" theory, and the province of the Supreme Court as "final arbiter," are topics especially investigated, with such further aids as the writings of the day and the discussions of the ratifying state conventions afford. Besides the class work each student will present a written report upon the history of some important bill providing for the admission of a state,and some constitutional question in connection with congressional legislation.

8. AMERICAN HISTORY SINCE 1789 AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW MR. WEST
Three credits (three hours per week) First semester
Open to seniors and graduate students who have completed courses 2, 5, 6 and 7; not given in 1909-10.

This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from *Thayer's Cases on Constitutional Law*, studied in their historical setting and with reference to the course of development.

9. STUDIES IN AMERICAN STATESMEN MR. ANDERSON
Three credits (three hours per week) Second semester
Open to juniors, seniors, and graduate students, who have completed courses 2 and at least the first semester of course 5.

A research course. Each member of the class makes a study of some prominent American statesman who has left a considerable body of materials valuable for information upon his own career and the general history of the United States. The greater part of the work consists in the sifting of these materials and the preparation of brief reports in regard to points assigned for investigation. The class exercises are chiefly devoted to the criticism of these reports and the synthesis of the results thus obtained. Only a limited period is traversed. In the work will be confined to the period of the Federalist supremacy, 1789-1801.

10. A CRITICAL STUDY OF A HISTORICAL MASTERPIECE MR. ANDERSON
Three credits (three hours per week) First semester
Open to those who have completed course 5.

The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Each student will be required to read critically the entire work studied and, in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussing carried on by the students under the direction of the instructor. In 1909-10, Rhode's *History of the United States from the Compromise of* 1850 *to the Restoration of Home Rule in the south in* 1877 will be read.

11. THE HISTORY OF AMERICAN DIPLOMACY MR. ANDERSON
Three credits (three hours per week) First semester
Open to seniors and graduates who have completed course 5.

A research course dealing principally with the more important features of American foreign policy during the earlier years of the federal government.

12. THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789 MR. ANDERSON
Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

This course centers about the critical reading of the principal treaties and numerous state papers dealing with international relations.

13. COLONIAL EXPANSION AND ADMINISTRATION MR. WEST
Three credits (three hours per week) Second semester
Open to seniors and graduate who have completed course 4 or course 5; given in alternate years; not offered in 1909-10.

The history of the colonial acquisitions of the great nations will be surveyed rapidly and colonial institution and governments will be studied and compared in detail.

14. A CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY

MR. WEST

Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed eighteen credits, including course 5;both semesters must be completed before credit is given for the first semester; given in alternate years.

This is primarily a course in historical criticism, based on a minute study of Winthrop's *History of New England*. Each member of the seminar has a group of secondary authorities assigned him which he is to criticise in the light of the original sources. The study involves also a careful comparison of the chief sources with one another, and incidedtally it leads to a minute treatment of political, social, and economic development in early New England. The number admitted to the course is limited to seven.

17. BEGINNINGS OF PARLIAMENT

MR. WHITE

Three credits (three hours per week Second semester

Open to juniors, seniors and graduates, who have completed twelve credits including course 2. Students should have a reading knowledge of Latin. Latin 9 gives a good preparation for this period.

This course will be given in alternate years with course 18, not given in 1909-10.

18. ORIGIN OF THE ENGLISH JUDICIAL SYSTEM

MR. WHITE

Three credits (three hours per week) Second semester

Open to juniors, seniors and graduates who have completed six credits, including course 2, and who obtain the permission of the instructor; students should be able to read Latin, and Latin 9 is recommended to give this preparation.

The work will consist of detailed study in the sources of the twelfth and thirteenth centuries, and will aim to show how the king's court, from which the present judicial system has grown, superseded the older communal and private courts, the development of the primitive king's court into a system of courts, and the growth in it of a new procedure. In this last connection the critical stages in the early history of the jury will receive special attention. This course will be given in alternate years with 17. Given in 1909-10.

19. ENGLISH INSTITUTIONAL DEVELOPMENT IN THE SEVENTEENTH CENTURY

MR. NOTESTEIN

Three credits (three hours per week) Second semester

Open to juniors, seniors and graduates who have completed twelve credits in history, including course 2.

22. GREEK POLITICAL INSTITUTIONS

MR. DAVIS

Three credits (three hours per week) Second semester

Open to juniors, seniors, and graduates, who have completed courses 1 or 2, 21 and six additional credits.

A study of the development of Greek political forms and of their operation as seen in typical oligarchic, democratic, federal, and monarchic states.

23. ROMAN IMPERIAL ORGANIZATION

MR. DAVIS

Three credits (three hours per week) Second semester

Open to juniors, seniors and graduates, who have completed twelve credits.

This course will survey the development and organization of the imperial system from the beginning of Roman expansion outside of Italy to the time of the Germanic invasion. Special attention will be given to the administration of the municipalities and provinces under the Empire and to the development of despotism

LATIN

Joseph B. Pike, Professor, Head of Department of Latin
John S. Clark, Professor
John E. Granrud, Professor

REQUIREMENTS OF THE DEPARTMENT

For a Minor, courses 1, 2, 3 and 4.

For a Major, courses 1, 2, 3 and 4, together with six additional credits selected from courses 6 and 14 inclusive, and reinforcing subjects (thirty credits) selected from Greek, advanced modern language, English (course 3, 4, 5, 6, 24 and 25) philology, history (courses 1, 15, 21, 17, 18 22 and 23) philosophy (course 9), political science (course 19) and additional Latin courses.

For B. A. with Distinction, the general requirements (page 46) and twelve credits in addition to the requirements for a major, course 10 being compulsory.

For a Teacher's Certificate, course 1, 2, 3, 4, 6, and 7 with an average of at least good.

		Courses			
No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Livy	1	3	Fresh.	4 yrs. prep Latin
2.	Plautus and Terence	2	3	Fresh.	1
3.	Horace	1	3	Soph., Jr., Sr.	1 and 2
4.	Roman Lit	2	3	Soph., Jr., Sr.	1-3
5.	Ovid	1, 2*	2	Soph., Jr., Sr.	1 and 2
6.	Adv. Cæsar	1	3	Jr., Sr.	1-4
7.	Adv. Virgil	2	3	Jr., Sr.	1-4
8.	Pliny's Letters	1	2	Jr., Sr.	1-4
9.	Med. Latin	1	1	Jr., Sr.	1-4
10.	Composition	2	2	Jr., Sr.	1-4
11.	Elegiac Poetry	1	3	Jr., Sr.	1-4
12.	Corresp. of Cicero	1	2	Jr., Sr.	1-4
13.	Satire	2	3	Jr., Sr.	1-4
14.	Drama	2	2	Jr., Sr.	1-4
15.	Arch. and Public Life	1	2	Jr., Sr.	None
16.	Private Pife	2	2	Jr., Sr.	None
17.	Lucretius	1, 2	2	Grad.	
18.	Seneca	1, 2	2	Grad.	
19.	Roman Elooquence	1, 2	2	Grad.	

*Both semesters must be completed before credit is given for the first semester.

1. Livy: Books I, II, XXI, XXII. Selections — Messrs. Pike, Clark and Granrud

Three credits (three hours per week) — First semester

Open to freshmen who have completed four years of Latin in preparatory schools; course 2 must also be completed before credit is given for this course.

The course consists of (a) a correct translation of Latin into idomatic English with a study of the difference between the idioms of the two languages; (b) Latin composition and review of the principles of Latin syntax.

2. Plautus and Terence, Selections — Messrs. Pike, Clark and Granrud

Three credits (three hours per week) — Second semester

Open to freshmen who have completed course 1.

The course comprises the translations of selected plays of Plautus and Terence with an outline study of the beginnings of the Roman drama and also of Roman political institutions.

3. HORACE — MESSRS. PIKE AND GRANRUD

Three credits (three hours per week) — First semester

Open to those who have taken course 1 and 2; course 4 must also be taken before credit is given for this course.

Selections from the odes, epodes, satires and epistles with a study of the life and literary art of Horace.

4. ROMAN LITERATURE — MESSRS. PIKE AND GRANRUD

Three credits (three hours per week) — Second semester

Open to those who have taken courses 1, 2 and 3.

A brief history of Roman literature with illustrative readings from the most important writers.

5. OVID — MR. CLARK

Two credits (one hour per week) — Both semesters

Open to those who have taken courses 1 and 2; both semesters must be completed before credit is given for the first semester.

Translations from Ovid's *Fasti*, with a study of the religion and religious ceremonials of the Romans.

6. ADVANCED COURSE IN CÆSAR — MR. PIKE

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.

Selections from books five to seven of the Gallic War and from the Civil War. Thorough study of the principles of indirect discourse. Intermediate Latin composition. An amount of time approximately equal to one hour for one-half semester will be spent upon the technical portions of the work, e. g., class drill work and discussion of various problems connected with secondary school work in Latin.

7. ADVANCED COURSE in VIRGIL — MR. PIKE

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.

An interpretation of selections from books seven to twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages. An amount of time approximately equal to one hour for one-half semester will be spent upon the strictly technical portions of the subject.

8. PLINY'S LETTERS — MR. PIKE

Two credits (two hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from the correspondence of Pliny the Younger with a study of his times.

9. MEDIEVAL LATIN — MR. PIKE

One credit (one hour per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

A course intended primarily to assist the student in rendering Latin historical documents of the middle ages. The work consists principally in the reading of selec ted documents of the middle ages with an outline of the main peculiarities of medieval Latin.

10. LATIN COMPOSITION — MR. PIKE

Two credits (two hours per week) — Second semester

Open to those who have completed course 1 to 4 inclusive; required for degree with distinction.

A course in advanced Latin composition and a study of Latin prose style.

11. ROMAN ELEGIAC POETRY — MR. CLARK

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from Catullus, Tibullus, Propertius, and Ovid, with a study of the rise, development and characteristics of Roman elegiac poetry.

12. CORRESPONDENCE OF CICERO — MR. CLARK

Two credits (two hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from the letters of Cicero, with a study of his life and the history of his times.

13. ROMAN SATIRE — MR. CLARK

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from Juvenal, Persius, Horace, and from early satire, with a study of the rise, development, and characteristics of Roman satire.

14. ROMAN DRAMA — MR. CLARK

Two credits (two hours per week) — Second semester

Selections from Seneca's tragedies and from the comedies of Plautus and Terence, with a study of the rise and development of the drama at Rome.

15. ROMAN ARCHÆOLOGY AND PUBLIC LIFE — MR. GRANRUD

Two credits (two hours per week) — First semester

Open to juniors and seniors; no knowledge of Latin required.

A study of the city of Rome; the forums; Roman architecture, sculpture, and painting; the Roman assemblies, senate, and magistracies. Lectures with stereopticon views and collateral reading. Not credited toward a major or minor.

16. ROMAN PRIVATE LIFE — MR. GRANRUD

Two credits (two hours per week) — Second semester

Open to juniors and seniors; no knowledge of Latin is required.

The Roman house, family, dress, food, education, and amusements are studied. Lectures with stereopticon views and collateral reading. Not credited toward a major or minor.

17. LUCRETIUS — MR. CLARK

Two credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The course consists of the reading and interpretation of the text of Lucretius with a study of his philosophy and its sources.

18. SENECA — MR. PIKE

Two credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Reading, interpretation and annotation of the *de Beneficiis* of Seneca with a study of Stoicism at Rome.

19. **The Theory of Roman Eloquence** — **Mr. Granrud**
Two credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Cicero's *De Oratore* will form the basis of the work.

MATHEMATICS

John F. Downey, Professor, Head of Department of Mathematics
George N. Bauer, Professor
William H. Bussey, Assistant Professor
Anthony L. Underhill, Assistant Professor
George P. Paine, Assistant Professor
Royal R. Shumway, Instructor
James S. Mikesh, Instructor.

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not including courses 1 and 2.

For a Major, eighteen credits, including course 9, but not including courses 1 and 2, together with reinforcing subjects (thirty credits) selected from astronomy, physics, mechanics, logic, advanced modern language and additional mathematics.

For B. A. with Distinction, the general requirements (page 46) and one year of pure mathematics in addition to the requirements for a major.

For a Teacher's Certificate, an average of at least good in courses 6, 7, 8 and 9. Course 13 is also recommended.

Courses

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Higher Alg. Part I..........	1	5	Fresh.	El. Alg.
2.	Alg. cont. and Pl. Trig......	2	5	Fresh.	1
3.	Higher Alg. Part II.........	1	3*†	Fresh., Soph.	1
4.	Trigonometry..............	2	3*†	Fresh., Soph.	3
5.	Hgr. Alg. Parts II & III and Trig.	1, 2	10	Fresh.	1
6.	Higher Alg. Part III	1	3	Soph., Jr., Sr.	2 or 3
7.	Analyt. Geom.............	2	3	Soph., Jr., Sr.	6
8.	Differential Calculus	1	3	Jr., Sr.	7
9.	Integral Calculus..........	2	3	Jr., Sr.	8
10.	Adv. Plane Anal. Geom.....	1	3	Jr., Sr.	7
11.	Solid Anal. Geom...........	2	3	Jr., Sr.	10
12.	Differential Equations......	1	3	Sr.	9
13.	Mathematical Pedagogy....	2	1	Sr.	7
14.	Method of Least Squares....	2	2	Sr.	9
15.	Theoretical Mechanics......	1, 2	10	Sr.	9
16.	Advanced Calculus..........	1, 2		Grad.	9
17	Modern Geometry..........	1, 2		Grad.	9 and 11

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
18.	Theory of Numbers........	1, 2		Grad.	9
19.	Funcs. of a Cplx. Var.......	1, 2		Grad.	12
20.	Projective Geometry.......	1, 2		Grad.	9, 10, 11
21.	Elliptic Integrals..........	1, 2		Grad.	12

*Juniors and seniors are allowed only half credit.

†Both semesters must be completed before credit is given for the first semester.

1. HIGHER ALGEBRA, Part I — MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE AND MIKESH

Five credits (five hours per week) — First semester

Required of freshmen who have not an entrance credit in the subject; must be followed by course 2; not open to those who have taken the subject in the preparatory school; not credited toward a minor in mathematics.

The fundamentals rules, factoring, highest common divisor, lowest common multiple, fractions, involution, evolution, surds, imaginaries, simple equations with one, two or more unknown quantities, ratio, proportion, variation and progressions.

The examples and problems are more difficult than those under the same subjects in elementary algebra and demonstrations are an important part of the work.

2. ALGEBRA CONTINUED AND PLANE TRIGONOMETRY — MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE AND MIKESH

Five credits (five hours per week) — Second semester

Required of freshmen who have not an entrance credit in course 1.

This is a continuation of course 1 and consists of algebra through logarithms and plane trigonometry.

3. HIGHER ALGEBRA, PART II. — MESSRS. BAUER, BUSSEY, UNDERHILL AND PAINE

Three credits (three hours per week) — First semester

Open to those who have completed course 1; must be followed by course 4.

Variation, quadratic equations, special higher equations, simultaneous equations of the second degree, maxima and minima of algebraic functions, differentiation of algebraic functions, development of functions, logarithms, theory of equations and solution of numerical higher equations.

4. TRIGONOMETRY — MESSRS. BUSSEY AND PAINE

Three credits (three hours per week) — Second semester

Open to those who have completed course 3.

Text, tables, and numerous problems.

5. HIGHER ALGEBRA, Parts II and III, AND TRIGONOMETRY — MESSRS. BUSSEY, PAINE AND MIKESH

Ten credits (five hours per week) — Both semesters

Required of freshmen who have an entrance credit in course 1, but not in solid geometry, and of freshmen in the School of Chemistry.

6. HIGHER ALGEBRA, PART III — MESSRS. BUSSEY AND PAINE

Three credits (three hours per week) — First semester

Open to those who have completed course 2 or 4.

Maxima and minima of functions, indeterminate forms, discussion of functions and problems, indeterminate equations, theory of equations and solution of numerical higher eqations, series, interlopation, permutations and combinations, and determinants.

7. **ANALYTICAL GEOMETRY** MESSRS. BUSSEY, UNDERHILL AND PAINE
Three credits (three hours per week) First semester
Open to those who have completed course 6.

Rectilinear and polar co-ordinates, producing equations of loci whose law of development is known, constructing and discussing such equations, transformation of co-ordinates, properties of the straight line, the conic sections and higher plane curves by means of their eqations.

8. **DIFFERENTIAL CALCULUS** MESSRS. DOWNEY AND UNDERHILL
Three credits (three hours per week) First semester
Open to those who have completed course 7.

Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, subtangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes, and singular points. Not given in 1909-10.

9. **INTEGRAL CALCULUS** MESSRS. DOWNEY AND UNDERHILL
Three credits (three hours per week) Second semester (first semester in 1909-10).
Open to those who have completed course 8.

Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volumes.

10. **ADVANCED COURSE IN PLANE ANALYTICAL GEOMETRY** MR. BAUER
Three credits (three hours per week) First semester
Open to those who have completed course 7.

Supplementary to course 7, treating more fully of the subjects of that course and taking up additional subjects.

11. **SOLID ANALYTICAL GEOMETRY** MR. BAUER
Three credits (three hours per week) Second semester
Open to those who have completed course 10.

Elementary theorems of projection, co-ordinates, the plane, the line in space, quadric surfaces, transformation of co-ordinates, tangents, poles and polars, the general equation of the second degree. Numerous examples are assigned to illustrate the theory.

12. **DIFFERENTIAL EQUATIONS** MR. DOWNEY
Three credits (three hours per week) First semester (second semester in 1909-10).
Open to those who have completed course 9.
Text and lectures.

13. **MATHEMATICAL PEDAGOGY** MR. BAUER
One credit (one hour per week) Second semester
Open to those who have completed course 7

A lecture course, in which special attention is paid to the fundamental principles of algebra and geometry.

14. **METHOD OF LEAST SQUARES** MR. LEAVENWORTH
Two credits (two hours per week) Second semester
Open to those who have completed course 9.

A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering, physics and astronomy.

15. THEORETICAL MECHANICS (In College of Engineering)
Ten credits (five hours per week) Both semesters
Open to those who have completed course 10.
Recitations and lectures.

16. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS MR. DOWNEY
Open to graduate students who have completed course 9. Both semesters
This course goes farther into some of the subjects treated in courses 8 and 9, and takes up some important subjects not included in those courses.

17. MODERN GEOMETRY MR. BAUER
Both semesters
Open to graduate students who have completed courses 9 and 11.

18. THEORY OF NUMBERS MR. BUSSEY
Open to graduate students who have completed course 9. Both semesters

19. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE MR. UNDERHILL
Open to graduate students who have completed course 12. Both semesters
Lectures, readings and problems.

20. PROJECTIVE GEOMETRY MR. BUSSEY
Both semesters
Open to graduate students who have completed courses, 9, 10 and 11.

21. ELLIPTIC INTEGRALS MR. BROOKE
(In the College of Engineering).
Open to graduate students who have completed course 12. Both semesters

MILITARY SCIENCE AND TACTICS

EDWARD SIGERFOOS, Professor, Head of Department of Military Science and Tactics
BERT ROSE, Instructor of Band

MILITARY SCIENCE AND TACTICS

1. MILITARY DRILL MR. SIGERFOOS
(Three hours per week) First and second semester
Drill is required of all men in the freshman and sophomore classes.

Freshman—Practical instruction in schools of the soldier, company and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore—Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of three battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about $15.

Military drill may be taken voluntarily by others outside of the freshman and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, a year's drill is allowed to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

2. Military Science — Mr. Sigerfoos
(Two hours per week) — Second semester
Optional with juniors and seniors.

Theoretical instruction—Advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

This work when satisfactorily completed taken in connection with the year's drill will give a four-hour credit for the semester.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company, battalion and regimental manœuvres, guards and the theoretical and practical use of firearms.

On graduation of each class the Commandant will report to the Adjutant General of the Army the names of the graduates who may have shown special aptitude for the military service and furnish a copy thereof to the Adjutant General of the State.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment and able to pass a creditable examination in drill regulations. In general, the officers are selected from the senior class; the sergeants from the junior class; and the corporals from the sophomore class.

THE ROSTER OF THE CORPS OF CADETS

Cadet Colonel

Chester S. Wilson.

Cadet Majors

Wilbur D. Shaw.
J. Russell Smith.
John W. Haw.

Band

B. A. Rose, Instructor of Music.
R. T. Glyer, Cadet Chief Musician.
W. W. Norton, Cadet Principal Musician.

Cadet Captains

Lawrence W. King, Company E.
Lewis S. Diamond, Company A.
Robert W. Foulke, Company C.
Willis Shippam, Company G.
S. G. Mooney, Company F.
Maurice V. Jenness, Company B.
L. V. Crandall, Company I.
Robert A. Pratt, Company D.

Robert Nelson, Regimental Quartermaster.
Allan B. Stork, Company H.
Chas. T. Haas, Regimental Commissary.
Warner G. Workman, Regimental Adjutant.
A. R. Blackburn, Company K.
V. L. Lenz, Company L.
Max Brownell, Company M.
V. Chase, Company N.

Cadet First Lieutenants

J. R. Buffington, Adjutant First Battalion.
G. M. Briggs, Adjutant Third Battalion.
W. D. Timperly, Commanding Battery.
Oscar V. Anderson, Company F.
Harry W. Dahleen, Company G.
Thomas A. Peppard, Adjutant Second Battalion.
Donald R. Brewster, Company I.
Porteus B. Palmer, Company E.
Howard R. Hush, Company B.
H. R. Bicknell, Company C.
Allan J. Wash, Company D.
C. P. Robb, Quartermaster Third Battalion.
C. Arthur Carlson, Company A.
Cyrus H. Fiske, Company H.
E. Hoffman, Company K.
L. E. Mark, Company L.
M. D. Clark, Company M.

Cadet Second Lieutenants

George P. Gurley, Company A.
Lewis H. Merrill, Quartermaster First Battalion.
Sheldon H. Smith, Battery.
C. Hugo Nelson, Company F.
C. T. Ekman, Company G.
C. W. Bowen, Company I.
W. F. Cantwell, Company H.
Paul Johnson, Company G.
J. E. Dorsey, Company B.
R. W. Whittier, Quartermaster Second Battalion.
Howard Williams, Company C.
C. M. Jesperson, Company E.
R. D. Newhall, Company D.
Harold Munck, Company A.
P. A. Anderson, Assistant Adjutant Third Battalion.
R. V. Smith, Company K.
D. Holbrook, Company L.
Geo. Workman, Company M.
H. C. Huntly, Company N.

MUSIC

Carlyle Scott, Professor, Head of Department of Music

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits, not including courses 4, 6 and 7.

A Major is not offered.

Students entering the University for the express purpose of studying music must register for courses 1 and 4 and two other three-hour subjects outside of the Department of Music.

With practical aim of the theoretical courses is to acquaint the student with the laws underlying musical composition, enabling him, at the same time, through critical analysis, to arrive at the keenest perception and appreciation of master works in music; and, finally, to stimulate latent talent to self-expression of musical thoughts in correct form. A certificate of proficiency in music will be granted to students who, having completed the theoretical courses and two year of pianoforte, are able to play one of the standard concertos and, in addition, show marked musical ability.

Courses

No.	Title	Semester	Credits	Offered to	Prerep. courses
1.	Harmony..................	1, 2	4	Jr., Sr.	None
2.	Counterpoint..............	1, 2	4	Jr., Sr.	See statement
3.	Form and Composition.....	2	2	Sr.	See statement
4.	Pianoforte.................	1, 2	3 or 6	Jr., Sr.	See statement
5.	Pinoforte, second course....	1, 2	3 or 6	Jr., Sr.	See statement
6.	Choral culture.............	1, 2	1 or 4	Jr., Sr.	See statement
8.	History of Music...........	1, 2	2	Jr., Sr.	None

1. **Harmony** — Mr. Scott

Four credits (two hours per week) — Both semesters

Open to juniors and seniors. The fee is four dollars per semester.

The study of chords, their construction, relations, and progressions. The work consists of written exercises on basses, the harmonization of given melodies. Foote and Spaulding's *Modern Harmony* is used as text book.

2. **Counterpoint** — Mr. Scott

Four credits (two hours per week) — Both semesters

Open to juniors and seniors who have a thorough knowledge of harmony. The fee is four dollars per semester.

The work includes the harmonization of melodies in two, three, and four voices in the different orders of counterpoint. Spaulding's *Tonal Counterpoint* is used as a text book.

3. **Musical Form and Free Composition** — Mr. Scott

Two credits (two hours per week) — Second semester

Open to seniors who have completed courses 1 and the first semester of course 2; for those specializing in music and can be taken only with the consent of the instructor. The fee is four dollars per semester.

At the close of the year a program of original composition will be given.

4. **Pianoforte** — Mr. Scott

Three or six credits (one and a half or three hours per week) — Both semesters

Open to juniors and seniors, who have mastered technical difficulties of the degree of Czerny's *School of Velocity* and the easier Haydn and Mozart sonatas, for those who intend to pursue the higher branches of the pianoforte, the art of playing, or to fit themselves for piano teachers. The fee is thirty-two or sixty-four dollars per semester.

5. PIANOFORTE, second course — MR. SCOTT

Three or six credits (one and a half or three hours per week) — Both semesters

Open to seniors who have completed course 4. The fee is thirty-two or sixty-four dollars per semester.

6. CHORAL CULTURE — MR. SCOTT

Two credits (one hour per week) — Both semesters

Open to juniors and seniors. The fee is two dollars per semester. A single credit may be secured for chorus work. Students may pursue the chorus work without credit, by paying the required fee and securing consent of the director.

A popular course in choral practice for four-part mixed voices, with occasional selections for male voices and female voices separately; features: sight singing with hints on proper tone-production, correct breathing, vocalization and solfeggio; the art-forms in choral compositions will be studied and analyzed. (Chorus a capella, motet, cantata, oratorio.)

8. HISTORY OF MUSIC — MR. SCOTT

Two credits (one hour per week) — Both semesters

Open to juniors and seniors. The fee is four dollars per semester.

A literary course. Lectures are given on the development of music from the time of Palestrina to the present day.

PHILOSOPHY AND PSYCHOLOGY

NORMAN WILDE, Professor, Head of Department of Philosophy and Psychology
DAVID F. SWENSON, Assistant Professor
JAMES B. MINER, Assistant Professor
ROWLAND HAYNES, Assistant Professor
HERBERT H. WOODROW, Instructor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected as follows: in philosophy, Greek, Latin, mathematics, physics, sociology, political science, English and additional philosophy and psychology; in psychology, biology, physics, education and additional philosophy and psychology.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major, at least six of twenty-four credits in the department being from intensive courses.

The courses offered by the department fall into three groups.

1. *Introductory courses;* 1 and 2. Course 1 is required for all advanced work in psychology, and either 1 or 2 for all work in philosophy, but students are advised to take both.

2. *General courses.*

3. *Advanced intensive courses.* These courses are open only to graduates and properly qualified seniors. All will not be offered each year but a selection will be made to meet the qualifications of the students presenting themselves.

The courses may also be grouped according to their purpose as follows:

1. Of special value for education: 1, 2, 3 and 11.
2. Fundamental courses in psychology: 1, 3, 4, 5, 16, and 21.
3. Fundamental courses in philosophy: 1, 2, 9, 10, 11 and 14.

Courses

No.	Title	Semester	Credits	Offered to	Prereq.-courses
1.	Introductory Psych.	1 or 2	3	Soph., Jr., Sr.	None
2.	Logic	1 or 2	3	Soph., Jr., Sr.	None
3.	Educational Psych.	1 or 2	3	Soph., Jr., Sr.	1
4.	Exp. Psych.: The Senses	1	3	Jr., Sr.	1
5.	Exp. Psych.: Higher Mental Processes	2	3	Jr., Sr.	1 and 4
7.	Psychological Interpretation	1	3	Jr., Sr.	1
8.	Aesthetics	2	3	Jr., Sr.	1
9.	Ancient and Med. Philos.	1	3	Jr., Sr.	1 or 2
10.	Modern Philosophy	2	3	Jr., Sr.	1 or 2
11.	Principles of Ethics	1	3	Jr., Sr.	1 or 2
12.	Phil. of Religion	2	3	Jr., Sr.	1 or 2
13.	Psychol. of Moral and Relig. Develop.	1	3	Jr., Sr.	3
14.	Logic of Science	2	3	Jr., Sr.	2
15.	Mental Retardation	2	3	Jr., Sr., Grad.	3
16.	Psychological Problems	1, 2	..	Sr. Grad.	1, 4 and 5
17.	Research in Psych.	1, 2	6†	Grad.	16
18.	*Descartes, Spinoza, Leibnitz	1, 2	6†	Sr. Grad.	9 and 10
19.	*Kant	1, 2	6†	Sr. Grad.	9 and 10
20.	*Hume	1, 2	6†	Sr. Grad.	9 and 10
21.	Psychol. Principles	1	3	Jr., Sr., Grad.	1 and 2
*22	.Metaphysics	1, 2	6†	Sr. Grad.	9 and 10 or 11
*23.	Systematic Ethics	1, 2	6†	Sr Grad.	9, 10 and 11
*24.	Hist. of Ethics	1, 2	6†	Sr. Grad.	9, 10 and 11
*25.	German Idealism	1, 2	6†	Grad.	9, 10 and 19
*26.	The Nervous System and Mental Life	2	3	Jr., Sr., Grad.	1

†Both semesters must be completed before credit is given for the first semester.

*Open to students only upon approval of the department.

INTRODUCTORY COURSES

1. INTRODUCTORY PSYCHOLOGY MESSRS. MINER, SWENSON AND HAYNES

Three credits (three hours per week) Each semester

Open to sophomores, juniors and seniors; required for all advanced work in psychology and for the teacher's certificate; it also serves as an introduction to the courses in philosophy.

The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. In connection with the work several lectures and demonstrations on the nature of the nervous system will be given in the neurological laboratory of the College of Medicine and Surgery. Text book, essays, and discussions.

2. LOGIC MESSRS. WILDE, SWENSON AND HAYNES

Three credits (three hours per week) Each semester

Open to sophomores, juniors, and seniors.

A study of the nature of knowledge, the laws of reasoning, and the principles and methods of scientific proof. The aim of the course is to produce accuracy of thought as well as to familiarize the student with the logical grounds of modern science Text book, lectures, and reports.

GENERAL COURSES

3. **EDUCATIONAL PSYCHOLOGY** — MESSRS. MINER AND HAYNES

Three credits (three hours per week) — Each semester

Open to those who have completed course 1.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. **EXPERIMENTAL PSYCHOLOGY: The Senses** — MESSRS. MINER AND HAYNES

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1. As the number in each laboratory section will be limited, students should arrange with the instructor for their section before registration.

This course, together with course 5, is designed to give a general survey of experimental methods and results as well as a training for laboratory research in psychology. The work involves typical experiments on sensation and movement. One hour of class discussion and two double hour laboratory periods are required.

5. **EXPERIMENTAL PSYCHOLOGY: Higher Mental Processes** — MR. MINER

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed courses 1 and 4.

A continuation of course 4 with experiments on affection, memory, attention, and such other processes as can be studied by laboratory methods. The quantitative phase of experimental psychology is taken up for special discussion.

6. **OUTLINE OF EXPERIMENTAL PSYCHOLOGY** — MR. MINER

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1; not given in 1909-10.

A study of the methods and accredited results of experimental investigation in psychology. Class-room demonstrations, lectures and discussion.

7. **PSYCHOLOGICAL INTERPRETATION** — MR. MINER

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1.

Unusual and pathological mental states are studied for the light they throw upon normal mental life. The student is given drill in the detecting of mental defects and in the psychological explanation of characters in history and literature. The subconscious, dreams, suggestibility, telepathy, nervous disorders, insanity, secondary personalities, and the crowd are among the topics treated.

8. **AESTHETICS** — MR. SWENSON

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1.

An introduction to the history and theory of aesthetics, including a psychological analysis of the consciousness of beauty and of the æsthetic impulse and some consideration of the main historic theories of beauty.

9. **ANCIENT AND MEDIAEVAL PHILOSOPHY** — MR. WILDE

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1 or course 2.

This and the following course are designed to give such an outline of the history of thought as is desirable in a general education. Emphasis is placed upon the human significance of philosophy rather than upon its purely technical aspect. In this first semester the main work will be upon the philosophies of Plato and Aristotle, but the later development will be traced as far as the Renaissance.

10. MODERN PHILOSOPHY — MR. WILDE
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or course 2.

Lectures on the representative systems of modern philosophy from the Renaissance to our own day, the purpose of the course being to prepare the student to understand the philosophical tendencies of the present. The work will include a study of Bacon, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant, Mill, Schopenhauer.

11. PRINCIPLES OF ETHICS — MR. WILDE
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 1 or course 2.

An introductory course, comprising a study of the distinction between moral and non-moral phenomena, an analysis of voluntary conduct, and a discussion of the nature of conscience, the meaning of right and wrong, the purpose of life, human responsibility, and the authority of moral law.

12. PHILOSOPHY OF RELIGION — MR. WILDE
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1 or course 2.

A study of the religious consciousness, its origin, development and significance; an analysis of the conception of God and a discussion of the place and function of religion in modern life.

13. PSYCHOLOGY OF MORAL AND RELIGIOUS DEVELOPMENT — MR. HAYNES
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed course 3.

The purposes of this course are (1) to give a psychological analysis of moral and religious experience, (2) to trace the usual course of development in the individual of these forms of experience, and (3) to suggest the application of these facts to moral and religious education.

ADVANCED INTENSIVE COURSES

14. LOGIC OF SCIENCE — MR. SWENSON
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 2.

This course serves as an introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relations of their fundamental principles.

15. MENTAL RETARDATION — MR.
Three credits (three hours per week) — Second semester

Open to juniors, seniors and graduates who have completed course 3. A study of the nature and conditions of retarded and perverted development in children with a view to the detection of mental defects and the devising of special methods for the training of backward children. The course is specially designed for those contemplating teaching or social work. The observation of backward children will be part of the work required.

16. PSYCHOLOGICAL PROBLEMS — MR. MINER
Both semesters

Open to seniors and graduate students who have completed courses, 1, 4 and 5; other arrangements may be ascertained upon application to the department.

Original work on special topics.

17. RESEARCH IN PSYCHOLOGY — MR. MINER
Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course '17; both semesters must be taken before credit is given for the first semester.

Minor or major research in experimental, educational, analytic, genetic, or comparative psychology.

18. THE PHILOSOPHY OF DESCARTES, SPINOZA AND LEIBNITZ — MR. SWENSON
Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.

A study of the pre-critical period of modern philosophy. The work will center in the discussion of the *Ethics* of Spinoza and *Monadology* of Leibnitz.

19. THE PHILOSOPHY OF KANT — MR. SWENSON
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 1, 2, 9, and 10; both semester must be completed before credit is given for the first semester.

A critical reading of the three Critiques; the relation of Kant to the development of modern philosophy.

20. THE PHILOSOPHY OF HUME — MR. SWENSON
Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9 and 10; both semester must be completed before credit is given for the first semester.

A critical reading of Hume's philosophical works; the position of Hume in the development of English philosophy.

21. PSYCHOLOGICAL PRINCIPLES — MR. SWENSON
Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed courses 1 and 2.

An advanced course, treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

22. METAPHYSICS — MR. SWENSON
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed course 9 and course 10 or 11; both semester must be completed before credit is given for the first semester.

A critical and constructive discussion of theories of knowledge and reality.

23. SYSTEMATIC ETHICS — MR. WILDE
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10 and 11; both semesters must be completed before credit is given for the first semester.

A detailed study of the principles of conduct and the basis of moral obligation.

24. HISTORY OF ETHICS — MR. WILDE
Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10 and 11; both semesters must be completed before credit is given for the first semester.

A critical study of the development of Greek, English and German ethical thought. Chief attention will be paid to the work of Plato and Aristotle in ancient times, and to the relation between utilitarianism and idealism in modern philosophy.

25. GERMAN IDEALISM — MR. WILDE
Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course 9, 10, and 19; both semesters must be completed before credit is given for the first semester; a knowledge of German is required.

A study of the development of German philosophy after Kant, especially as found in the writings of Fichte and Hegel.

26. THE NERVOUS SYSTEM AND MENTAL LIFE — MR. JOHNSTON
Three credits (three hours per week) — Second semester

Open to juniors, seniors and graduates by consent of the instructor.

This course is given in the neurological laboratory of the College of Medicine and Surgery and is recommended for advanced students in psychology and education.

The course will include an analysis of nervous mechanisms on the basis of function, followed by a study of the mechanisms of correlation, the growth and education of the nervous system, cerebral functions and localization, and the neural basis of elementary phenomena of consciousness.

PHYSICAL TRAINING

FOR MEN

LOUIS J. COOKE, Director
WILLIAM K. FOSTER, Assistant Director

A well-equipped gymnasium in charge of a professional medical director is open for the young men. The training and exercise is under the immediate oversight and authority of the medical director and is wholly with a view to the healthful physical development of the whole student body.

All young men are required to be examined by the medical director of physical culture upon registration and during the course as often as the indications of the physical conditions may require.

The decision of the director will be either:

1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or
2. Mandatory requiring the students to pursue the course of hygiene and physical exercise necessary for the proper care of health and the discharge of their duties as students.

Gymnasium work is required of all men in the freshman class, one hour per week (in two half-hour periods, if the director so decides) throughout the year. The required work includes a course on personal hygiene during the first semester.

FOR WOMEN

ANNA M. BUTNER, Director
JESSIE A. MATSON, Assistant

The course in physical culture is offered to the women of the University as a regular part of their work in the freshman year, and may be taken in any of the following years. A full year of work, in addition to the work required in this department, counts as a two-hour credit in the second semester of the senior year. The work consists of systematic exercises for the development of all parts of the body. Women pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse waist and bloomers, with the regulation shoes. All suits must be of black material.

It is a common observation that students often enter the University with an imperfect physical development because of an excessive use of some muscles, while others are weakened through disuse. This occasions attitudes and movements that are unseemly in appearance and unhealthful in their general effect. The purpose of this course, therefore, is to develop a strong and symmetrical physique with a graceful and easy carriage. A physical examination is made of each student and physical measurements are taken in the fall and again in the spring.

In addition to the regular class work, sports and pastimes are open to all women of the University. These include basket ball, indoor base ball, archery, tennis, and also the use of the running track and swimming pool.

PHYSICS

JOHN ZELENY, Professor, Head of Department of Physics
ANTHONY ZELENY, Professor
HENRY S. ERIKSON, Assistant Professor
ALOIS F. KOVARIK, Instructor
WILLIAM F. HOLMAN, Instructor.
——————————, Instructor
LOUIS W. MCKEEHAN, Assistant
FRANZ AUST, Assistant

FOR A MINOR, twelve credits, not including courses 1, 2, 3 and 4.

FOR A MAJOR, eighteen credits, not including courses 1, 2 3 and 4, together with reinforcing subjects (thirty credits) selected from mathematics, mechanics, astronomy, advanced modern language, and additional physics.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and courses 5, 6, 7 and 8, and four other courses open to juniors and seniors, together with mathematics 9 and 10.

FOR A TEACHER'S CERTIFICATE, courses 5, 6, 7, 8 and 22, and six credits in chemistry.

Students should begin the study of physics with course 5. Courses 1 and 3 are elementary in character and do not prepare the student for any other courses in the department except courses 2 and 4.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. Courses
1.	Gen. Physics..............	1	3	Soph., Jr., Sr.	Math. 4 or 2
2.	Gen. Lab. Practice.........	1	1	Soph., Jr., Sr.	See statement
3.	Gen. Physics..............	2	3	Soph., Jr., Sr.	1
4.	Gen. Lab. Practice.........	2	1	Soph., Jr., Sr.	See Statement
5.	Mechanics of Solids and Fluids...............	1	4	Soph., Jr., Sr.	Math. 4 or 2
6.	Heat, Magnetism and Electrostatics............	2	4	Soph., Jr., Sr.	5

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Electrokinetics	1	4	Jr., Sr.	6
8.	Sound and Light	2	4	Jr., Sr.	5
9.	Advanced Electrical Measurements	2	1	Jr., Sr.	7
10.	Physical Manip. and Lab. Technique	2	3	Jr., Sr.	5 and 6
11.	Dynamics	1	3	Jr., Sr.	5 and Math. 9-10
12.	Adv. Physical Measurements	1	3	Sr. Grad.	5, 6, 7 and 8
13.	Adv. Physical Measurements	1	6	Sr. Grad.	5, 6, 7 and 8
14.	Theory of Light	2	3	Grad.	8 and Math. 9-10
15.	Elect. Meas. of Precision	2	3	Sr.	7
16.	Radioactivity	2	3	Grad.	5, 6, 7 and 8
17.	Adv. Phys. Measurements	2	3	Sr. Grad.	5, 6, 7 and 8
18.	Adv. Phys. Measurements	2	6	Sr. Grad.	5. 6. 7 and 8
19.	Kinetic Theory of Gases	2	3	Sr. Grad	5, 6, 7 and 8
20.	Discharge of Elect. thru Gases	1	3	Grad.	6 and 7 and Math. 9 and 10
21.	Math. Theory of Elect. and Magnetism	2	3	Grad.	6 and 7, and Math. 9 and 10
22.	Teachers' Course	2	1	Sr.	5-8 incl.

1. GENERAL PHYSICS — MR. JOHN ZELENY
Three credits (three hours per week) — First semester

Open to sophomores, juniors and seniors who have completed mathematics 4 or 2; may be taken separately or in conjunction with course 2.

Mechanics of solids and fluids, heat and sound. This is the first part of an elementary course in physics, designed for those who do not intend to pursue the subject longer than one year. The course is experimental rather than mathematical and gives the student a general knowledge of the fundamental principles of the subject. There will be one experimental lecture and two recitations each week.

2. GENERAL LABORATORY PRACTICE — MR. KOVARIK
One credit (two hours per week) — First semester

Open to sophomores, juniors and seniors, who have completed or are taking course 1. The laboratory fee is three dollars.

Physical measurements in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods.

3. GENERAL PHYSICS — MR. JOHN ZELENY
Three credits (three hours per week) — Second semester

Open to sophomores, juniors and seniors, who have completed course 1; may be taken separately or in conjunction with course 4.

Light, electricity and magnetism. This is the second part of the elementary course began under course 1. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, X radiation, and the electrical constitution of matter, are discussed and illustrated. There will be one experimental lecture and two recitations each week.

4. GENERAL LABORATORY PRACTICE — MR. KOVARIK
One credit (two hours per week) — Second semester

Open to sophomores, juniors and seniors, who have completed or are taking course 3. The laboratory fee is three dollars.

Physical measurements in light, electricity and magnetism, giving the student a knowledge of experimental methods.

5. MECHANICS OF SOLIDS AND FLUIDS

MESSRS. JONES, J. ZELENY, A. ZELENY ERIKSON AND KOVARIK

First semester

Four credits, (three recitations and one lecture or two hours laboratory)

Open to sophomores, juniors and seniors who have completed mathematics 4 or 2 (Trigonometry)

The laboratory fee is two dollars.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.

6. HEAT, MAGNETISM AND ELECTROSTATICS

MESSRS. JONES, J. ZELENY A. ZELENY, ERIKSON AND KOVARIK

Four credits (one lecture, two recitations and two hours laboratory)

Second semester

Open to those who have completed course 5.

The laboratory fee is three dollars.

The fundamental principles of the subjects are studied mainly from the experimental side. The laboratory work consists of the measurements of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS

MESSRS. JONES, J. ZELENY, A. ZELENY, ERIKSON AND KOVARIK

Four credits (one lecture, two recitations and two hours laboratory)

First semester

Open to those who have completed course 6. The laboratory fee is three dollars.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges, Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT

MESSRS. JONES, J. ZELENY, ERIKSON AND KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory)

Second semester

Open to those who have completed course 5. The laboratory fee is three dollars.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight into some of the relations which obtain in the subjects.

9. ADVANCED ELECTRICAL MEASUREMENTS

MR. A. ZELENY

One credit (two hours per week)

Second semester

Open to those who have completed course 7.

The laboratory fee is three dollars.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities.

10. PHYSICAL MANIPULATION AND LABORATORY TECHNIQUE MR. JOHN ZELENY
Three credits (six hours per week) Second semester.

Open to juniors and seniors who have completed courses 5 and 6. The laboratory fee is three dollars This course is especially useful to those who intend to teach the science or to specialize in it.

The object of the course is to give the student a knowledge of the essential physical manipulations (such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc.), and to acquaint him with the use of some instruments of precision (such as the cathetometer, the dividing engine, the balance, mercury air pumps and guages, etc.)

11. DYNAMICS MR. JONES
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed courses 5 and 6, and mathematics 9 and 10 (calculus).

A discussion of some problems in dynamics which are important in the study of advanced physics.

12. ADVANCED PHYSICAL MEASUREMENTS MR. JOHN ZELENY
Three credits (six hours per week) First or second semester

Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is three dollars.

The course consists of individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

13. ADVANCED PHYSICAL MEASUREMENTS MR. JOHN ZELENY
Six credits (twelve hours per week) First or second semester

Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is five dollars.

The same as course 10 except that twice as much time is devoted to the subject.

14. THE THEORY OF LIGHT MR. JONES
Three credits (three hours per week) Second semester

Open to graduate students who have completed course 8 and mathematics 9 and 10 (calculus).

A study of the important optical phenomena. Preston's *Theory of Light* is used as a text.

15. ELECTRICAL MEASUREMENTS OF PRECISION MR. ANTHONY ZELENY
Three credits (six hours per week) Second semester

Open to seniors and graduate students who have completed course 7. The laboratory fee is three dollars. The course is intended for electrical engineering and scientific students who desire to specialize in electrical work of the highest precision.

The course is chiefly experimental and includes the following: making of standard cells; calibration of Wheatstone box bridge; adjustment of resistances, ammeters, and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance, and magnetic flux; measurement of temperatures by electrical methods.

16. RADIO-ACTIVITY MR. KOVARIK
Three credits (three hours per week) Second semester

Open to graduate students who have completed courses 5, 6, 7 and 8.

The course consists entirely of lectures, experimental and descriptive. The various theories and the methods of investigation are fully considered.

17. ADVANCED PHYSICAL MEASUREMENTS — MR. JOHN ZELENY
Three credits (six hours per week) — Second semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.

The course is the experimental study of some physical phenomena, the nature or laws of which are not yet understood.

18. ADVANCED PHYSICAL MEASUREMENTS — MR. JOHN ZELENY
Six credits (twelve hours per week) — Second semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is five dollars.

The same as course 17, except that twice as much time is devoted to the subject.

19. THE KINETIC THEORY OF GASES — MR. ERIKSON
Three credits (three hours per week) — Second semester

Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).

This course is a study of Meyer's *Kinetic Theory of Gases.*

20. DISCHARGE OF ELECTRICITY THROUGH GASES — MR. JOHN ZELENY
Three credits (three hours per week) — First semester

Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).

The course consists of lectures, with experimental illustrations, on the conduction of electricity through gases. A study is made of the conductivity imparted to gases by the action of X rays, ultra-violet light, radio-active substances, and glowing metals; of the discharge of electricity from points and in vacuum tubes; and of the spark and arc discharges. The methods of measuring the velocity of the ions and the charges carried by them are studied in detail.

21. THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM
MR. JOHN ZELENY
Three credits (three hours per week) — Second semester

Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).

This course consists in the study of J. J. Thomson's *Elements of the Mathematical Theory of Electricity and Magnetism.*

22. TEACHER'S COURSE — MR. JONES
One credit (one hour per week) — Second semester

Open to seniors who have completed courses 5 to 8 inclusive.

No subject matter is discussed, but methods of presentation and the selection of lecture and laboratory experiments are considered. The work is conducted by the students under the direct supervision of the instructor.

RHETORIC AND PUBLIC SPEAKING

JOSEPH M. THOMAS, Professor, Head of Department of Rhetoric and Public Speaking

ADA L. COMSTOCK, Professor

Frank M. Rarig, Assistant Professor
Oscar W. Firkins, Assistant Professor
——————————, Assistant Professor
Charles W. Nichols, Instructor
Wilford O. Clure, Instructor
Haldor Gislason, Instructor
Anna H. Phelan, Instructor
Nellie A. Whitney, Instructor
Thomas Cahill, Assistant

REQUIREMENTS OF THE DEPARTMENT

For a Minor, twelve credits not including course 1.

For a Major, eighteen credits, not including courses 1, together with reinforcing subjects (thirty credits) selected from English (courses 3, 16, 21 and 22), philology, philosophy, Latin, advanced modern languarge and additional rhetoric.

For B. A. with Distinction, the general requirements (page 46) and six credits in the department in addition to the requirements for a major.

For a Teacher's Certificate, an average of at least good in courses 1, 2, 3 5 and 6, and two additional courses in argumentation and elocution or public speaking.

HONORS IN PUBLIC SPEAKING

Students who have been on the debating teams in their freshman and sophomore years, or have won places in the oratorical contests of those years, and have taken part in intersociety and intercollegiate debates, winning at least one intercollegiate contest, or have won places in the Pillsbury oratorical contest, may, if the department deems them worthy, receive honors in public speaking.

Courses

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Composition and Rhetoric...	1, 2	6	Fresh.	None
2.	Advanced Comp. and Rhet. .	1, 2	6	Soph., Jr., Sr.	1
3.	Advanced Rhetoric..........	1, 2	6	Jr., Sr.	1 and 2
4.	Argumentative Writing.....	1	3	Jr., Sr.	1 and 2
5.	Short Story Writing........	2	3	Jr., Sr.	1 and 2
6.	Seminar....................	1, 2	4	Sr., Grad.	Statement
10.	Public Speaking............	1, 2	6	Soph., Jr., Sr.	1 or Eng. 1 and 2
11.	Interpretative Reading.....	1, 2	6	Jr., Sr.	1 or Eng. 1 and 2 and 10
12.	Argumentation and Debate..	1, 2	6	Jr., Sr.	Same as 11
13.	Oratorical Composition......	1, 2	6	Jr., Sr.	Same as 11

RHETORIC

1. Composition and Rhetoric Messrs. Thomas, Firkins, Clure and Miss Comstock, Miss Whitney, and Mrs. Phelan

Six credits (three hours per week) Both semesters

Required of freshmen who have not passed , with a grade of good or excellent, part 2 of the entrance examination in English.

The aim of this course is to give practical training in the art of writing. In connection with the written work the student will be required to study the principles of structure and to analyze specimens of good prose.

2. ADVANCED COMPOSITION AND RHETORIC — MESSRS. THOMAS, FIRKINS AND CLURE, MISS WHITNEY AND MRS. PHELAN
Six credits (three hours per week) — Both semesters
Open to those who have completed course 1, or English 1 and 2.

This course is intended to give the student practice in writing in the four type-forms of discourse. Description and narration will be studied in the first semester, exposition and argument in the second. Fortnightly themes and short exercises will be accompanied by lectures on theory and the analysis of models.

3. ADVANCED RHETORIC — MISS COMSTOCK
Six credits (three hours per week) — Both semesters
Open to juniors and seniors who have taken courses 1 and 2.

Structure and style, theoretically and practically considered, are subjects of study in this course. Some time is given to the oral presentation of topics. In the composition work the student is allowed to select his own subjects and methods of treatment.

4. ARGUMENTATIVE WRITING — MR. THOMAS
Three credits (three hours per week) — First semester
Open to those who have completed courses 1 and 2.

A study of the principles which underlie argument. Special attention will be paid to the brief and relative value of various forms of proof. The course will include lectures, recitations and weekly essays.

5. SHORT STORY WRITING — MR. THOMAS
Three credits (three hours per week) — Second semester
Open to those who have shown exceptional proficiency in course 2.

Analytical studies in the technique of the short story will be accompanied by constructive work in story writing.

6. SEMINAR — MR. THOMAS
Four credits (two hours per week) — Both semesters
Open to seniors and graduates who have taken courses 1 and 2 and at least one other course.

This is intended for those who are specializing in Rhetoric and Composition. In 1909–10 the course will be devoted to lectures, reports and thesis on the history of rhetorical theory.

PUBLIC SPEAKING

10. A GENERAL COURSE IN PUBLIC SPEAKING — MESSRS. RARIG AND GISLASON
Six credits (three hours per week) — Both semesters
Open to those who have had Rhetoric 1, or English 1 and 2.

The work of the first semester consists of the study and practice of the principles of breathing, voice production, articulation and gesture. During the second semester students make short speeches of their own composition and deliver extracts from the works of well known writers and speakers.

11. INTERPRETATIVE READING — MR. RARIG
Six credits (three hours per week) — Both semesters
Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

This course aims to develop intelligent, suggestive, sympathetic reading. The text used is Shakespeare's plays.

12. ARGUMENTATION AND DEBATE — MR. GISLASON
Six credits (three hours per week) — Both semesters

Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

This course furnishes instruction in the science of organization and in the art of debate. The work consists of the study of the laws and processes of reasoning and their application to written and spoken argument. Argumentative writings and speeches by eminent men are analyzed and briefed. Practical exercises in debate and forensics form an important part of the work. Students receive individual training in delivery.

13. INTER-COLLEGIATE DEBATING — MR. RARIG
Three credits (three hours per week) — First semester

Only men who have been awarded places on the inter-collegiate debating teams and the alternates will register for this course. The question for inter-collegiate debate will be studied and briefed, and frequent practice debates will be held.

14. ORATORICAL COMPOSITION — MR. RARIG
Six credits (three hours per week) — Both semesters

Open to those who have had Rhetoric 1, or English 1 and 2, and Rhetoric 10.

Masterpieces of oratory are read and analyzed. Students write orations with special reference to the occasion, the timeliness of the material used, and the nature of the audience.

ROMANCE LANGUAGES

CHARLES W. BENTON, Professor, Head of Department of Romance Languages
CHARLES M. ANDRIST, Professor
JULIUS T. FRELIN, Assistant Professor
CARL M. MELOM, Instructor
EMMA BERTIN, Instructor
RENE M. DELAMARE, Assistant

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, in French, course 2 or 3 and course 5; in Spanish, twelve credits.

FOR A MAJOR, in French, courses 2 or 3, 5 and 7, together with reinforcing subjects (thirty credits) selected from philology, Latin, Italian, Spanish, English, philosophy, history, and additional French; in Spanish, eighteen credits, together with reinforcing subjects (thirty credits) selected from French, philology, Latin, Italian, English, and history.

FOR B. A. WITH DISTINCTION (in French only), the general requirements (page 46) and courses 8 and 9 or 10 in addition to the requirements for a major.

FOR A TEACHER'S CERTIFICATE, an average of at least good in courses 2 or 3, 4, 5 6, 7 and 8.

Courses

No.	Title	Semesters	Credits	Offered to	Prereq. courses
1.	Begin. French	1, 2	10†*	All	None
2.	Intermediate French	1, 2	6†	Soph., Jr., Sr.	1
3.	Adv. Fr. G. and Comp.	1, 2	6*	All	None
4.	Begin. Fr. Conversation	1, 2	4*	Soph., Jr., Sr.	See statement
5.	Classic Fr. Lit	1, 2	6*	Soph., Jr., Sr.	2 or 3
6.	Adv. Fr. Conversation	1, 2	4*	Soph., Jr., Sr.	2 or 3
7.	Fr. Lit. of 19 Cent	1, 2	6*	Soph., Jr., Sr.	2 or 3
8.	Teachers Fr	1, 2	2*	Jr., Sr.	5
9.	Romance Phil	1, 2	2*	Jr., Sr.	5
10.	Italian Lit	1, 2	2*	Jr., Sr.	5
11.	Begin. Spanish	1, 2	10*	Soph., Jr., Sr.	Two years prep.
12.	Intermediate Span	1, 2	6*	Soph., Jr., Sr.	11
13.	Adv. Span	1, 2	6*	Jr., Sr.	12
14.	Old French	1, 2	4	Grad.	
15.	Hist. of Fr. Lit	1. 2	6*	Grad.	
16.	Ital. Lit	1, 2	2*	Grad.	5

*Both semesters must be completed before credit is given for the first semester.
†Juniors and seniors receive only half credit.

1. Beginning French — Messrs. Andrist and Frelin and Madam Bertin

Ten credits (five hours per week) — Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French.

Fraser and Squair's *French Grammar and Reader:* modern texts.

2. Intermediate French — Messrs. Andrist and Frelin and Madam Bertin

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.

Francois *Advanced French Prose Composition:* modern texts will be read, including some of the works of Coppee, Merimee, Daudet, Scribe, et al.

3. Advanced French Grammar and Composition — Messrs. Andrist and Frelin

Six credits (three hours per week) — Both semesters

Open to all who enter the University with two years of French; both semesters must be completed before credit is given for the first semester.

Francois' *Introduction to French Composition:* readings from modern authors, including selections from Coppee, Feuillet, and Sandeau.

4. Beginning French Conversation — Messrs. Andrist and Frelin and Madam Bertin

Four credits (two hours per week) — Both semesters

Open to those who have completed or who are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.

Conversation based on modern French life.

5. The Classical Period of French Literature — Mr. Benton

Six credits (three hours per week) — Both semesters

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

The reading of works and selections produced during the classical period of French literature and conversations in French concerning the same. The works of Corneille, Racine, Moliere, La Fontaine, et al. Compositions.

6. ADVANCED FRENCH CONVERSATION — MR. BENTON
Four credits (two hours per week) — Both semester

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

Conversations on French history, literature, the drama, etc.

7. FRENCH LITERATURE OF THE NINETEENTH CENTURY — MR BENTON
Six credits(three hours per week) — Both semesters

Open to those who have completed course 2 or course 3 and course 5; both semesters must be completed before credit is given for the first semester.

Lectures in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.

8. TEACHER'S COURSE IN FRENCH — MR. BENTON
Two credits (one hour per week) — Both semesters

Open to those who have completed course five; both semesters must be completed before credit is given for the first semester.

Special practice in pronunciation. Discussion in French of methods of teaching the French language and literature.

9. ROMANCE PHILOLOGY — MR. BENTON
Two credits (one hour per week) — Both semesters

Open to those who have completed course 5; both semesters must be completed before credit is given for the first semesters.

Lectures on the phonetical development of the French and other Romance language from popular Latin. Reading of old French texts.

10. ITALIAN LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters

Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

Edgren's *Italian Grammar*, Dante's *Divine Comedy*.

11. BEGINNING SPANISH — MR. MELOM
Ten credits (five hours per week) — Both semesters

Open to sophomores, juniors and seniors. Both semesters must be completed before credit is given for the first semester.

Monsanto and Languellier's *Spanish Course-Josselyn*. Worman's *First Spanish Book*. Bransby's *Spanish Reader*.

12. INTERMEDIATE SPANISH — MR. MELOM
Six credits (three hours per week) — Both semesters

Open to those who have completed course 11; both semesters must be complete before credit is given for the first semester.

First semester: Umphrey, *Spanish Composition:* Brownel, *El Pajaro Verde*. Second semester: Grays's *Fortuna:* Alarcon's *El Capitan Veneno*.

13. ADVANCED SPANISH — MR. MELOM
Six credits (three hours per week) — Both semesters

Open to those who have completed course 11 and 12; both semesters must be completed before credit is given for the first semester.

F. Solderilla, *Compendio de la Literatura Espanola:* Alarcon's *El Sombrero de Tres Picos.* Lectures and collateral readings of representative Spanish authors.

14. ROMANCE LANGUAGES OLD FRENCH — MR. BENTON
Four credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Comparative phonetics and grammar of French and other Romance languages. Some of the oldest monuments of the French language are studied and the phonetic changes compared with modern French and English. Special attention is given to the period when French words came into the English language.

15. HISTORY OF FRENCH LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters

Open to graduate students; both semesters must be completed before credit is given for the first semester.

A discussion of the evolution of the various schools and doctrines in French literature.

16. ITALIAN LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters

Open only to graduate students who have completed course 5; both semesters must be completed before credit is given for the first semester.

History of Italian Literature, special: *The Divine Comedy.*

SCANDINAVIAN

GISLE BOTHNE, Professor, Head of Department of Scandinavian Languages
ANDREW A. STOMBERG, Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits, not including course 1 and 3.

FOR A MAJOR, eighteen credits, not including courses 1 and 3, together with reinforcing subjects (thirty credits) selected from philology, advanced German, Anglo-Saxon and old English, Latin, Greek, advanced English and additional Scandinavian.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and one year of Scandinavian in addition to what is required for a major.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Elem. Norwegian..........	1, 2	10*†	All	None
2.	Adv. Norwegian...........	1, 2	6*	Soph., Jr., Sr.	1
3.	Elem. Swedish............	1, 2	10*†	All	None
4.	Adv. Swedish.............	1, 2	6*	Soph., Jr., Sr.	3
5.	Old Norse (Icelandic).......	1, 2	4	Jr., Sr., Grad.	1 and 2, or 3 & 4.
6.	Modern Norwegian Lit......	1, 2	6*	Jr., Sr., Grad.	1 and 2
7.	Swedish Literature.........	1, 2	6*	Jr., Sr., Grad.	3 and 4
8.	Henrik Ibsen..............	1	2*	Jr., Sr., Grad.	See statement
9.	History of Northern Europe	1, 2,	6	Jr., Sr.	None
10.	Early Nor. Lit.............	1	2	Jr., Sr.	See statement
11.	Mod. Danish Lit...........	2	2	Jr., Sr.	See statement

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
12.	Swedish Lang. and Lit......			Grad.*	
13.	Hist. Scand. Lang..........	1, 2	2	Grad.	
14.	Adv. Old Norse.....	1, 2	4	Grad.	

*Boths semester must be completed before credit is given for the first semester.

†Juniors and seniors received only half credit.

1. **ELEMENTARY NORWEGIAN** Mr. BOTHNE

Ten credits (five hours per week) Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Elementary study of the language, grammar, composition, select reading in easy prose and poetry.

2. **ADVANCED NORWEGIAN** Mr. BOTHNE

Six credits (three hours per week) Both semesters

Open to those who have completed course 1 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.

Grammar, composition, conversation, elementary history of literature, and select works of modern authors.

3. **ELEMENTARY SWEDISH** Mr. STOMBERG

Ten credits (five hours per week) Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Grammar and composition; select reading in easy prose and verse.

4. **ADVANCED SWEDISH** Mr. STOMBERG

Six credits (three hours per week) Both semesters

Open to those who have completed course 3 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.

First semester: grammar and composition. Modern prose texts will be read. Second semester: an elementary history of the literature of Sweden and reading of Tegner's *Frithjofs Saga* and Rumeberg's *Fanrik Stals Sagner*.

5. **OLD NORSE (Icelandic)** Mr. BOTHNE

Four credits (two hours per week) Both semesters

Open to those who have completed courses 1 and 2, or 3 and 4, and to other qualified students with the approval of the department. Not given in 1909-10.

Grammar and reading. *Gunnlaugs Saga Ormstungu.*

6. **MODERN NORWEGIAN LITERATURE** Mr. BOTHNE

Six credits (three hours per week) Both semesters

Open to those who have completed courses 1 and 2; both semesters must be completed before credit is given for the first semester.

History of Norwegian literature from 1814 to the present day.

7. **SWEDISH LITERATURE** Mr. STOMBERG

Six credits (three hours per week) Both semesters

Open to qualified students upon the approval of the department; both semesters must be completed before credit is given for the first semester.

History of the literature and study of modern authors, including Selma Lagerlof, Geijerstam, Strindberg.

8. IBSEN — MR. BOTHNE
Two credits (two hours per week) — Second semester
Open to qualified students upon the approval of the department.
Lectures, reading and interpretation.

9. HISTORY OF NORTHERN EUROPE — MR. STOMBERG
Six credits (three hours per week) — Both semesters
Open to juniors and seniors; no knowledge of the Scandinavian languages is required.
The course includes the history of the Scandinavian countries from the earliest period to recent times.

10. EARLY NORWEGIAN LITERATURE — MR. BOTHNE
Two credits (two hours per week) — First semester
Open to qualified students upon approval of the department.

11. MODERN DANISH LITERATURE — Mr. BOTHNE.
Two credits (two hours per week) — Second semester

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE — MR. STOMBERG

13. HISTORY OF THE SCANDINAVIAN LANGUAGES — MR. BOTHNE
Two credits (one hour per week) — Both semesters
For courses in Scandinavian philology, see statement of the department of comparative philology. Not given in 1909-10.

14. OLD NORSE (advanced course THE ELDER EDDA — MR. BOTHNE
Four credits (two hours per week). Not given in 1909-10. — Both semesters

SEMITIC LANGUAGES

SAMUEL N. DEINARD, Assistant Professor

COURSES

No.	Title	Semester	Credits	Offered to	Prereq. courses
1.	Elem. Hebrew.............	1, 2	6*	Soph., Jr., Sr.	None
2.	Elem. Arabic..............	1, 2	6*	Jr., Sr.	Course 1
3.	Elem. Aramaic............	2	3	Jr., Sr.	Course 1
4.	Hist. Hebrews.............	1, 2	6	Jr., Sr.	None

*Both semesters must be completed before credit is given for the first semester.

1. ELEMENTARY HEBREW — MR. DEINARD
Six credits (three hours per week) — Both semesters
Open to sophomores, juniors, and seniors; both semesters must be completed before credit is given for the first semester.
First semester, Harper's *Elements of Hebrew* and reading of easy prose passages from the Old Testament; second semester, critical readings of some books of the Old Testament and a review of Hebrew grammar.

2. **ELEMENTARY ARABIC** — MR. DEINARD
Six credits (three hours per week) — Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

First semester, Socin's *Arabic Grammar* and the reading of the prose sections contained in it; second semester, selected suras from the Koran and a review of Arabic grammar.

3. **ELEMENTARY ARAMAIC OR SYRIAC** — MR. DEINARD
Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockleman's *Syrische Grammatik*.

4. **HISTORY OF THE HEBREWS TO THE CLOSE OF THE PERSIAN PERIOD** — MR. DEINARD
Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors; no knowledge of any Semitic language is required.

A survey of the political, social, and religious life of the Hebrews. The English Bible will be used as a text-book, a careful study of the Palestinian, Egyptian, and Assyro-Babylonian inscriptions will be made, and the works of some modern writers on Hebrew history will be consulted.

SOCIOLOGY AND ANTHROPOLOGY

SAMUEL G. SMITH, Professor, Head of Department of Sociology and Anthropology
ALBERT ERNEST JENKS, Professor
SAMUEL N. REEP, Assistant Professor

REQUIREMENTS OF THE DEPARTMENT

FOR A MINOR, twelve credits.

FOR A MAJOR, eighteen credits, together with reinforcing subjects (thirty credits) selected from economics and politics, history, animal biology, geology, psychology and additional sociology and anthropology.

FOR B. A. WITH DISTINCTION, the general requirements (page 46) and six credits in addition to the requirements for a major, with the provision that six credits shall be from advanced courses and one course shall be accompanied by individual work under the special direction of the department.

FOR A TEACHER'S CERTIFICATE, an average of at least good in four courses, one of which must be course 2.

FOR RECOMMENDATION FOR SOCIAL WORK, an average of at least good in not less than three courses, two of which must be courses 3 and 12.

COURSES

No.	Title	Semester	Credits	Offered to	Prereq-courses
1.	Descrip. Sociology..........	1	3	Jr., Sr.	None
2.	Elements of Sociology......	1, 2	3	Jr., Sr.	None
3.	Social Pathology...........	1	3	Jr., Sr.	None
4.	Social Theory.............	2	3	Jr., Sr., Grad.	2, 7 or 13
5.	Social Groups.............	2	3	Jr., Sr., Grad.	None
6.	Institutions...............	1	3	Jr., Sr.	None

COURSES (Continued)

No.	Title	Semester	Credits	Offered to	Prereq. courses
7.	Anthropology.............	1	3	Jr., Sr.	None
8.	Ethnology.................	2	3	Jr., Sr., Grad.	1, 2 or 7
9.	Philippine People..........	2	3	Jr., Sr., Grad.	1, 7 or 8
10.	Physical Anthropology.....	2	3	Jr., Sr., Grad.	7 or 8 or An. Biol
11.	American Negro Race......	2	3	Jr., Sr., Grad.	None
12.	American People...........	1	3	Jr., Sr., Grad.	None
13.	Biblical Sociology..........	1	3	Jr., Sr., Grad.	None
14.	Modern Social Institutions..	1	3	Jr., Sr., Grad.	None
15.	Social Psychology..........	1	3	Jr., Sr., Grad.	None

1. DESCRIPTIVE SOCIOLOGY — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors and seniors.

This is a preliminary course designed as the first work of students in the department. It presents concrete data concerning human association, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment; and it discovers the activities and institutions natural and peculiar to the several groups studied. Text-book, lectures, assigned readings, and thesis.

2. ELEMENTS OF SOCIOLOGY — MR. REEP
Three credits (three hours per week) — Each semester
Open to juniors and seniors.

This course is designed to give a general knowledge of the field of modern sociology, the attempt being to prepare students for such special sociological investigations as they may wish to make. Text-book, lectures, assigned readings, and thesis.

3. SOCIAL PATHOLOGY — MR. SMITH
Three credits (three hours per week) — First semester
Open to juniors and seniors.

This course covers the field of charities and corrections, dealing especially with problems of poverty, crime, insanity and social degeneration. It also presents a discussion of the child problem and methods of social amelioration.

4. SOCIAL THEORY — MR. REEP
Three credits (three hours per week) — Second semester
Open to juniors, seniors and graduate students.

This course includes a study of the leading American, English, French and German writers to discover their methods of approach to the science and the leading results they have secured.

5. SOCIAL GROUPS — MR. REEP
Three credits (three hours per week) — Second semester
Open to juniors, seniors and graduate students.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. THE STUDY OF INSTITUTIONS — MR. SMITH
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

The genesis of custom and the beginnings of law with the geographical and race influence in the growth of states will be studied as well as the various forms of the family and their relation to forms of civilization.

7. ANTHROPOLOGY — MR. JENKS

Three credits (three hours per week) — First semester

Open to juniors and seniors.

This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It primarily investigates the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text books, lectures, assigned readings, and thesis.

8. ETHNOLOGY — MR. JENKS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1, 2 or 7, and to graduate students.

This is a study of the different races of men natural to America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of several races and subraces are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Text-books, lectures, assigned readings, and thesis.

9. THE PHILIPPINE PEOPLE — MR, JENKS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1, 7 or 8, and graduate students.

This course presents the geography, natural resources, and ethnology of the Phillipine Islands. A careful comparative study of the four large ethnic and culture groups of people is made; tropical influences are noted; the present policy of the Insular Civil Government is outlined, so far as it tends to modify the natural characteristics and modern culture of the inhabitants, and to effect American home interests in the orient. This course aims to present a practical model for the investigator of human culture, and to introduce students to oriental race problems; it will also better fit students for government , business, or missionary service in the orient. Lectures illustrated lectures, assigned readings, and thesis.

10. PHYSICAL ANTHROPOLOGY — MR. JENKS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 7 or 8, or course 1 in Animal Biology, and to graduate students.

This course studies the physical variations in the human body. It pays special attention to those variations which distinguish one race or group of men from another; and it seeks the cause and significance of such variations. It also attempts to trace the physical evolution of the human body and to forecast its future, studying both its development and decline. Six lectures on the development and anatomy of the human brain are given by Dr. Charles A. Erdmann of the medical faculty. .This course is of prime importance to advanced students preparing for the medical course. Lectures, laboratory work, assigned readings, and thesis.

11. THE AMERICAN NEGRO RACE — MR. JENKS

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduate students; not given in 1909-10.

This course begins with a study of the negro's African tribal kinsmen, and traces the rises and development of the American negro race from the birth of American slavery. The present characteristics, traits, and conditions of the negro are especially nsidered.co The developing tendencies of the negro are studied for the purpose of considering the probable future of the American negro race. Lectures, assigned readings, and thesis.

12. THE AMERICAN PEOPLE — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors, seniors, and graduate students.

This course presents the distribution in the United States of the different peoples of the world found here. It seeks the natural genius of the peculiar home development of these peoples, and notes the modifications of this development in America, thus portraying the ethnic contribution of each to American civilization. It aims to discover the dominant physical, mental, and moral characteristics of each people, and attempts to determine the relative ethnic and culture importance of each to the nation.

13. BIBLICAL SOCIOLOGY — MR. SMITH
Three credits(three hours per week) — First semester
Open to juniors, seniors, and graduate students.

This is a study of the development of Hebrew institutions, especially the church, the family and the state. It also presents a comparison of similar institutions among peoples of like conditions of culture.

14. MODERN SOCIAL INSTITUTIONS — MR. REEP
Three credits (three hours per week) — First semester
Open to juniors, seniors and graduate students.

The fundamental social institution, the family, will be studied, as also the development of modern industrial, political, educational, and ecclesiastical institutions in their relation to human progress.

15. SOCIAL PSYCHOLOGY — MR. REEP
Three credits (three hours per week) — First semester
Open to juniors, seniors and graduate students.

This is a study of the social mind, public opinion, impulsive and rational social action, fashion, convention and custom, the mob and the crowd. It is also an examination of the theories of Giddings, Tarde, Baldwin, Ross, Brinton and others

IX

Departments of Instruction

B

THE COLLEGE of ENGINEERING and THE MECHANIC ARTS

The Purposes of the College

The College of Engineering and the Mechanic Arts was founded in accordance with the Laws of the State of Minnesota and of the Federal government, its object being "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It offers courses of study, of five years each, in civil, mechanical, electrical and municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being conferred at the end of the fourth year. This college also offers work in the graduate school leading to the degree of Master of Science.

The College of Engineering and the Mechanic Arts

FACULTY.

Cyrus Northrop, LL.D., President.
Frederick S. Jones, M.A., Dean.

Frederick H. Bass, B.S. 429 Union St., S. E.
Assistant Professor Municipal and Sanitary Engineering (12 M.A.)
William E. Brooke, B.C.E., M.A. 405 Oak St., S. E.
Professor of Mathematics and Mechanics (21 M.A.)
Charles W. Benton, M.A., Litt.D., 516 Ninth Ave., S.E.
Professor of French (201 F.H.)
Frederick E. Clements, Ph.D. 800 Fourth St., S.E.
Professor of Botany (36 P.H.)
Frank H. Constant, C.E. 1801 University Ave.
Professor of Structural Engineering (22 M. A.)
Alvin S. Cutler, C.E. 529 Oak St., S. E.
Assistant Professor of Railway Engineering (12 M.A.)
Henry T. Eddy, C.E., Ph.D., LL.D. 916 Sixth St., S. E.
Professor of Mathematics and Mechanics (11 M.E.)
Henry A. Erikson, E.E., Ph. D. 220 Church St., S. E.
Assistant Professor in Physics (22 Ph.)
John J. Flather, Ph.B., M.M.E. 315 Eleventh Ave., S. E.
Professor of Mechanical Engineering (12 M.E.)
George B. Frankforter, M.A., Ph.D. 525 River Road, S. E.
Professor of Chemistry (5 Ch.)
Everhart P. Harding, M.S., Ph.D. 1316 Sixth St., S. E.
Assistant Professor of Chemistry (13 Ch.)
Arthur Edwin Haynes, M.S., M.Ph., S.D. 703 River Road S. E.
Professor of Engineering Mathematics (18 M.A.)
Frederick S. Jones, M.A. 712 Tenth Ave., S. E.
Professor of Physics (15 Ph.)
William H. Kavanaugh, M.E. 118 State St., S. E.
Professor of Experimental Engineering (9 M.A.)

William H. Kirchner, B.S. 217 Beacon St., S. E.
Professor of Drawing and Descriptive Geometry (20 M.A.)
Francis P. Leavenworth, M.A. 317 Seventeenth Ave., S. E.
Professor of Astronomy (124 F.H.)
John V. Martenis, M.E. 217 Harvard St., S. E.
Assistant Professor of Mechanical Engineering (21 M.E.)
John G. Moore, B.A. 2810 University Ave., S. E.
Professor of German (209 F.H.)
Henry F. Nachtrieb, B.S. 905 Sixth St., S. E.
Professor of Animal Biology (38 P.H.)
Burt L. Newkirk, Ph.D. 1016 29th Ave., N. E.
Assistant Professor of Mathematics and Mechanics (17 M.A.)
Edward E. Nicholson, M.A. 914 Seventh St., S. E.
Assistant Professor of Chemistry (9 Ch.)
Edward Van Dyke Robinson, Ph.D. 1213 Seventh St., S. E.
Professor of Economics (18 Lib.)
William T. Ryan, E.E. Oak St., S. E.
Assistant Professor of Electrical Engineering (14 E.E.)
Maria L. Sanford 1050 Thirteenth Av., S. E.
Professor of Rhetoric and Elecution (311 F.H.)
Frederick W. Sardeson, Ph.D. 414 Harvard St., S. E.
Assistant Professor of Geology (23 P.H.)
William A. Schaper, M.A., Ph.D. 625 Fulton St., S. E.
Professor of Political Science (16 Lib.)
George D. Shepardson, M.A., M.E. 717 River Road S. E.
Professor of Electrical Engineering (30 E.E.)
S. Carl Shipley, B.S., M.E. 209 State St., S. E.
Superintendent of Shops (18 M.E.)
Charles F. Sidener, B.S. 1320 Fifth St., S. E.
Professor of Chemistry (26 Ch.)
Edward Sigerfoos, Captain 5th U. S. Infantry, Ph.B., LL.B.
Professor of Military Science 328 Tenth Ave. S. E.
Frank W. Springer, E.E. 1206 Fifth St., S. E.
Professor of Electrical Engineering (15 E.E.)
Frank F. Wesbrook, M.A., M.D., C.M. 906 Fifth St., S. E.
Professor of Pathology and Bacteriology (I.P.H.)
Anthony Zeleny, M.S., Ph.D. 321 Church St., S. E.
Professor of Physics (32 Ph.)
John Zeleny, B.A., Ph.D. 810 Sixth St., S. E.
Professor of Physics (20 Ph.)

INSTRUCTORS

Edward P. Burch, E.E. 1729 James Ave., So.
Lecturer in Electric Railway Engineering (30 E.E.)

Hobart D. Frary, M. E. 3108 Garfield Ave., S.
Instructor in Engineering Mathematics (17 M. A.)

Carl A. Herrick, M.E. 3232 Irving Ave., S.
Instructor in Mechanical Engineering (22 M.E.)

Alois F. Kovarik, B.A. 1523 Seventh St., S. E.
Instructor in Physics (17 Ph.)

O. B. Nelson, C. E. 1827 Fourteenth Ave., S.
Instructor in Civil Engineering and Drawing (M.A.)

William B. Newhall, M.E. 2702 Humboldt Ave., S.
Instructor in Structural Engineering and Surveying (22 M.A.)

Charles W. Nichols, M.A. 313 8th Ave., S. E.
Instructor in English (311 F.H.)

Peter Peterson, 710 Nineteenth Ave., S.
Instructor in Foundry Practice (M.E.)

Edward Quigley, 2442 15th Ave., S.
Instructor in Forge Work (M.E.)

William H. Richards, 2555 Emerson Ave., S.
Instructor in Carpentry and Pattern Work (28 M.E.)

Norman W. Rose, M.E. 412 Washington Ave., S. E.
Instructor in Drawing (M.A.)

Frank B. Rowley, B.S., M.E. 311 Harvard S., S. E.
Instructor in Drawing and Descriptive Geometry (26 M.A.)

C. F. Shoop, B. S. 1916 14th Ave., N.
Instructor in Experimental Engineering (9 M.A.)

Henry Ubrich, 602 Buchanan St., N. E.
Instructor in Carpentry (M.E.)

ASSISTANTS

Harry W. Dixon, Engineer 1800 4th St., S.E.
L. W. McKeehan, B.S., Assistant in Physics 1306 7th St., S. E.
Charles P. Clarke, B.S., Assistant in Drawing 209 State St., S. E.
Fred R. Grant, Assistant in Electrical Engineering 614 E. 22nd St.

STANDING COMMITTEES

Enrollment—Professors Constant, Haynes, Springer
Curriculum—Professors Eddy, Flather, Constant, Bass, Jones, Shepardson
Degrees—Professors Jones, Flather, Shepardson
Catalogue—Professor Kirchner
Military Affairs and Athletics—Professors Brooke, Haynes, Sigerfoos
Students' Work—Professors Jones, Newkirk, Cutler, Shepardson, Kavanaugh, Brooke
Graduate Studies and Degrees—Professor Eddy
Program—Professors Kirchner and Bass

Non-Resident Lecturers

CIVIL ENGINEERING

Geo. L. Wilson, Engineer, T. C. R. T. Co., Minneapolis.
L. T. Blanchard, Statistician, U. S. Reclamation Service, Washington.
Frank Nay, General Auditor, C. R. I. & P. R. R., Chicago.
J. A. L. Waddell, Consulting Engineer, Kansas City.
J. T. Fanning, Consulting Engineer, Minneapolis.
D. C. Morgan, Engineer, State Railroad and Warehouse Commission, St. Paul.
L. R. Clausen, Superintendent, C. M. & St. P. Ry., Milwaukee.

ELECTRICAL ENGINEERING

Edward P. Burch, Consulting Engineer, Minneapolis. "Speed-torque Characteristics of Steam Locomotives." "Speed-torque Characteristics of Electric Locomotives." "Advantages and Problems of Electric Traction for Heavy Railway Service." "Cost of Steam and Water Power for Railway Service." "Power Plants and Transmission Lines." "Plans for complete Electrification of a Steam Railway."

Fred G. Dustin, City Electrical Inspector, Minneapolis. "Safety in Electrical Construction."

John H. Schumacher, Electrical Engineer, Minneapolis Electrical Equipment Co. "Modern Interior Electrical Construction and Estimation of Cost."

Admission

(For list and description of subjects accepted for admission see page 68 and 69 and 77 to 83.)

ENTRANCE EXAMINATIONS

Every applicant for admission to the freshman class, must either,

(a) present State High School Board certificates for each of the mathematical subjects required for admission, or

(b) take the entrance examinations in said subjects at the University.

Beginning with Sept. 1911, the certificate for either higher algebra or solid geometry must be dated within one year of the time of presentation at the University, and the other must be dated within two years of such time.

No applicant will be admitted who fails to obtain credit in all of the mathematical subjects required for admission.

Students proposing to enter this college should be thoroughly prepared in mathematics, since the prosecution of the work depends so largely upon the preliminary training in this subject.

EXAMINATION IN ENGLISH

Every person admitted to this college will be examined in reading, writing, spelling and composition, and all who fail to obtain a grade of seventy-five per cent are required to pursue a course of instruction to be provided. No person shall ever receive a diploma or other certificate of merit or proficiency until he has passed such examination and obtained the specified credit.

TIME AND PLACE OF EXAMINATION

Entrance examinations are held only at the beginning of the college year (Tuesday, Sept. 7th). Applicants should present themselves to the registrar who will furnish them with application blanks and directions how to proceed with these examinations and registration. Students prevented from entering at the beginning of the year may be admitted at a subsequent date when circumstances are such as to justify the action. Such students are at a great disadvantage and all students expecting to enter the University are urged to be present at the beginning of the year. See page 3 for program of examinations.

ENTRANCE CONDITIONS

No applicant will be admitted who is deficient in more than one year credit. The deficiency becomes an entrance condition and must be made up before the student passes into the sophomore class. But no applicant will be admitted to the college with an entrance condition in mathematics.

Students are strongly advised to enter without entrance conditions if possible, since the work of the freshman year is arduous, requiring the full time and energy of the students to get the greatest benefit from it. It is very important that the candidate be fully prepared in the entrance requirement in chemistry.

MANUAL TRAINING

Credit for work done in manual training in the high schools is allowed under the following conditions:

(a) The course in drawing and shop work in the high schools must be approved by the corresponding departments in the college.

(b) The year credit must be that defined on page 15.

(c) Students presenting two or three year credits in wood-work from such courses will receive an advanced credit in one semester's work in carpentry.

(d) Students presenting three year credits from such courses in drawing will receive an advanced credit of the second semester freshman drawing.

(e) Students presenting four year credits from such courses in shop will receive an advanced credit in freshman carpentry and one semester sophomore machine shop.

(f) Students presenting four year credits from such courses in drawing will receive an advanced credit of the first and second semester freshman drawing, not including descriptive geometry.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this University, subject to the approval of the department concerned. In bringing certificates from other institutions, the records must be on the official blanks of the institution granting the certificates, and should show:

1. The subject studied and ground covered.
2. The time spent upon each subject.
3. In case of laboratory subjects a concise statement of work done.
4. The result. It is sufficient to state that the subject was creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult departments concerned in determining the credit to be given.

UNCLASSED STUDENTS

Unclassed students are permitted to pursue, under the direction of the faculty, one or two lines of study, selected from some regular course. Such students must be persons of mature years and present preparation sufficient to admit them to the freshman class. Persons of mature years who shall give satisfactory evidence of ability to do with credit the work applied for, may be admitted by vote of the faculty.

GRADUATION

Students completing the course of study to the satisfaction of the faculty of the college are entitled to receive the professional degree. Any person may undergo, at suitable times, examination in any subject, and if such person pass in all the studies and exercises of the course, he is entitled to the appropriate degree; provided, however, that at least one full year must be spent at the University before such degree shall be granted; and provided the examination in every case be held before a committee of the faculty appointed for that purpose.

THESES

Every candidate for the degree of engineer is required to prepare a thesis on some subject particularly relating to his course. The thesis must embody the result of original research made by the student himself and be creditable from a literary as well as from a technical point of view.

Theses are to be written in a clear hand, or typewritten. The subject of the thesis is required to be reported to the head of the department in which the student is a candidate for a degree, and the work of preparation must be formally begun early in the year. During the second semester the student is expected to devote at least ten hours a week to the preparation of his thesis.

The subject of the thesis and character of the work to be done will be suggested in a large measure by the course of study pursued by the student. Great emphasis is laid upon the careful and accurate preparation of the thesis; because, more than any other work the undergraduate does, this certifies to his ability to undertake the difficult and responsible duties involved in the direction of engineering and industrial interests. The thesis must be completed and put into the hands of the faculty not later than Friday, June 3rd, upon a good quality of paper, 8½ by 11 inches, leaving a margin 1½ inches wide at the left for binding and a margin about 1½ inches wide on the other sides.

The original drawings, tracings, negatives, etc., are to be placed in the department files. Clear prints therefrom are to accompany the manuscript. The thesis shall be bound in black cloth and leather and shall be deposited in the department library.

FACULTY REGULATIONS

Registration for Work. Students will not receive credit for work done in classes for which they have not been registered.

Examination for credit. Students who make up work out of class and wish to take examinations to gain credit in their University course, shall apply to the faculty for permission to take the examinations.

Reports. At the end of each semester each student shall receive a mark in each subject for which he is registered. The several marks shall be as follows: A, pass with honor; B, pass with credit; P, pass; C, conditioned; F, failed.

In determining the standing of any student in any subject, the result of his daily work in that subject shall be combined with the result of the final examination in the ratio of two to one.

Subjects to be Repeated. Any student in the College of Engineering whose average for the year is below passing grade will be required on reentering the University to pursue again all the subjects of the year in which he has not passed with credit.

Students who receive a condition or failure in work of either semester so as to make it impossible for them to continue the same line of work in the following semester, will not be allowed to elect an advanced subject in place of the one omitted, but shall be required to devote their full time to the remaining subjects of the course.

However, those students who attain an average grade of B in the remaining subjects pursued may elect an advanced subject in the place of the one omitted.

Conditions and Failures. No student will be allowed to omit any freshman work in order to make up entrance conditions.

No student with an entrance condition will be allowed to register for any sophomore subject, nor will any student with a freshman condition or failure be allowed to register for a junior subject, nor will any student with a sophomore condition or failure be allowed to register for any senior subject.

A condition not made up before the subject is offered again becomes a failure subject to rules governing failures.

Students conditioned in the work of the first semester are given an opportunity to remove their conditions at the beginning of the first semester of the following year. Students conditioned in the work of the second semester are given an opportunity to remove their conditions at the beginning or end of the first semester of the following year, at the date regularly set for the program for such examinations, but can take no subjects which require this work as a prerequisite, until the condition has been removed. It is provided that if a student attempts to remove a condition at the first examination he will not be allowed to try the following examination, but shall be required to take the work over in class. Failures must be taken over again in class.

DROPPED FROM ROLLS. Any student receiving conditions or failures in more than fifty per cent of his work in the first semester shall be dropped from the rolls, and will not be allowed to re-enter the University until the opening of the following year.

General Information

BUILDINGS AND EQUIPMENT

As an integral part of the University of Minnesota, the College of Engineering and the Mechanic Arts enjoys the advantages of the resources of the institution to the fullest extent. In addition to the University libraries and laboratories in which engineering students receive instruction, three buildings are devoted exclusively to the work of this college. The Mechanic Arts Building is occupied by the Departments of Mathematics and Drawing and also affords temporary quarters for the Departments of Civil, Municipal and Experimental Engineering. The Mechanical Engineering Department has an entire building devoted to its special work and the Electrical Engineering Department together with the University Light and Power Plant occupies a third building.

At the last session of the Legislature a bill was passed appropriating $700,000 for special University purposes. Of this, $450,000 was designated as purchase money for additional land and $250,000 for the erection of a main engineering building and laboratory. It is hoped that these buildings will be completed during the coming year.

For information concerning methods of work and the equipment of the various departments the following condensed statements are offered.

LIBRARIES AND READING ROOMS

The reference libraries of the several departments are well supplied with technical literature. The civil engineering library comprises over one thousand volumes; the library of the department of mathematics and mechanics numbers eighteen hundred volumes of choice mathematical and scientific works; the departments of mechanical engineering, electrical engineering and of physics have excellent collections of standard works which number over fourteen hundred volumes; the chemistry library contains over five hundred technical works; the drawing department has a collection of two hundred volumes relating to drawing, architecture and design. The above libraries comprising upwards of four thousand volumes and including many works which are the private property of professors, are accessible to the students.

In addition to the above are the libraries of the University, the City of Minneapolis, the City of St. Paul and others, containing many works of value to the engineering profession. Standard works bearing on special subjects are purchased as they appear and the more important scientific and technical periodicals are secured and placed in the reading rooms maintained in connection with the several departments of the college.

Journal clubs are organized, in most of the departments, for the discussion of current technical literature, relating to the best modern practice. The students are kept in touch with the developments along engineering lines and are taught how to use the technical press.

In addition to the foregoing, the college has many periodicals donated by the societies publishing them, and others loaned by members of the faculty, who place their periodicals and professional libraries at the disposition of the students.

THE UNIVERSITY LIGHT AND POWER PLANT

The light and power plant was designed for the purpose of instruction and also for furnishing electric light and power to the various buildings, shops and laboratories of the University. The plant is characterized by the variety of its equipment, as well as by its value in developing power economically.

The boiler plant contains a 130-h.p. Cahall (B. & W. type) water tube boiler designed to carry a working pressure of 250 pounds; a 60x16 foot multitubular boiler which carries 175 pounds pressure; a Sorge-Cochrane purifier of 300-h.p. capacity; and a large Sturtevant fan and direct-connected engine, to be used for overloads and for experiments with mechanical draft.

In addition to this apparatus a three-stage Foster super-heater has recently been installed. This is arranged to superheat simultaneously 3500 pounds of steam at 175 pounds pressure to 80 degrees of superheat, an equal quantity of high pressure cylinder exhaust at 20 pounds pressure to 60 degrees, and 4500 pounds turbine steam at 175 pounds pressure to 250 degrees of superheat. The piping from super-heater to the various engines has been designed to permit of great flexibility which affords a wide scope for experimental work, as well as allowing different methods in their operation best suited to the conditions.

In the engine room there is an Allfree automatic expansion 75-h.p. engine, connected by belting to a jack shaft equipped with roller bearings. There is also, a 150-h.p. cross-compound Corliss engine especially designed forthe mechanical engineering department. This engine is provided with a Wheeler surface-condenser, and is arranged so that it may be run simple or compound, condensing or non-condensing, as desired. It thus constitutes a valuable part of the equipment for experimental work.

The engine room also contains a 150-h.p. DeLaval steam turbine direct connected to 100 kw. electric generator. This steam turbine is equipped with a double set of nozzles and is connected with a jet condenser, so that it may be run condensing or non-condensing as desired.

A 100-h.p. gas producer located in an annex to the boiler room has recently been installed and furnishes gas for the operation of a 65-h.p. Munzel two-cylinder gas engine direct connected to a 35-kw. generator.

The University electric light and power circuits are maintained at 114 and 228 volts, the principal supply being direct current from the University plant, supplemented by alternating current from transformers connected with the circuits of the Minneapolis General Electric Company. Equality of pressure on the two sides of the system is maintained independently or jointly by the various supply units, including: a twin Sprague 125-125-volt 100-kilowatt turbo-generator, a Westinghouse 250-volt 40-kilowatt belt-driven generator with auxiliary slip rings and balancing coils, a pair of Electric Machinery 125-volt 40-kilowatt belt-driven generators, a 250-volt 30-kilowatt Electric Machinery generator directly connected to a gas engine and having a motor-generator balancing set, a double 320-amperehour Chloride storage battery with end cells and motor-driven double booster set, and two 30-kilowatt 2300/230-115-volt transformers. Two switchboards, of six and seven panels respectively, provide for convenient control of the various supply and distributing circuits.

ELECTRICAL ENGINEERING

The electrical engineering department and the University electric light and power plant are housed in a brick building of slow-burning mill construction. The part of the building devoted exclusively to the work of the electrical engineering department of instruction is eighty feet long by sixty feet wide with two stories and full basement. In the basement are electro-chemical laboratory, shop, battery room, toilet and stock rooms. On the first floor are the dynamo laboratory, high tension laboratory, research laboratories, instrument rooms and offices. On the second floor are laboratories for photometry, photography, meter and lamp testing; and rooms for recitations, draughting, library and office.

THE LABORATORY EQUIPMENT includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant current and constant potential direct current generators and motors, single phase and polyphase alternators, commutating, induction and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, fans, and brakes afford convenient and ample means, for taking up the energy of dynamos and motors. To facilitate testing there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines. Power is obtainable from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of The Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 115-115 volts. An excellent assortment of instruments of well known American and foreign makers is available for laboratory use. A well equipped standardizing laboratory furnished with certified standards for current electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a wide variety of arc and incandescent lamps and meters with all necessary standards and other accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes. Alternators, rotary converters, transformers, lamps, condensers, oscillographs, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation. There is a variety of apparatus for special investigations. An electric car recently contributed by the Minneapolis Street Railway Company is being installed on a suitable testing rack and will provide facilities for investigating and demonstrating traction problems.

THE DEPARTMENT LIBRARY contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being collected and bound. These, with the files in the general and other department libraries of the University, offer excellent facilities for research work. Free access is given to the private libraries and collections of the professors.

The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests. A journal club meets for the discussion of current literature in mechanical and electrical engineering, keeping the students in touch with current progress and best modern practice, and teaching them the value of the technical press.

The collection of samples furnished by various manufacturers and dealers is a great help in exhibiting best modern practice and in teaching young engineers to appreciate the merits of different products. Samples from repair shops and elsewhere are of special value in illustrating the treatment received by apparatus in commercial use and necessity of careful design and construction.

INSTRUCTION. The course aims to give the students a knowledge of phenomena and principles and the various applications of electricity, the methods and instruments used in measuring and transforming it, and practice in the design and operation of electrical apparatus. Practice and theory are taken together as far as possible. During the junior and senior years, students have daily work with electrical instruments and apparatus, and with commercial problems. Occasional inspection tours among the extensive and varied electrical interests in Minneapolis and St. Paul furnish excellent illustration. The University electric light and power plant, which is in the same building, affords opportunity to observe commercial conditions at close range.

All engineering students are strongly advised to spend their vacations in factories, repair shops, electric light and railway stations, etc., in order to obtain commercial experience, and appreciate the relations of their technical training and actual work.

It is the aim to train students to be independent and efficient workers, and to adopt the methods of professional engineers. Students are required to verify the formulas used in various calculations, and are encouraged to derive their own formulas for simplifying work in special cases. At the same time they are expected to use logarithms, slide rules, tables, curves, charts, and all legitimate means for obtaining accurate results with least amount of drudgery.

The regular instructing force is supplemented by competent non-resident lecturers.

LABORATORY WORK. In the more advanced work students are encouraged to determine for themselves as independent workers the best methods and conditions for accurate results. While the laboratory work is classified, the students are treated individually and are advanced as rapidly as their attainments warrant.

In fitting up the laboratory, care is taken to secure representative types of apparatus of commercial style and size, in order to acquaint the students with actual practice. In putting up new lines and in setting up apparatus, the students are required to work in accordance with standard practice. Each student is given a certain amount of practice in the construction of electrical apparatus.

DESIGN. The electrical engineers have drawing and design in common with the mechanical engineers in the first three years. A large number of numerical problems are given during the course. During the junior and senior years, electro-magnets and mechanism, dynamos and motors, lines, switches, switchboards and plants are designed. Complete working drawings and specifications for some special problems are elaborated. A file of about six hundred blueprints and drawings in the department library in addition to those in other departments is available to the students.

EXPERIMENTAL ENGINEERING

THE LABORATORY, in which the experimental research of the college is conducted, has been considerably enlarged and its equipment greatly increased. Three universal testing machines of 50,000 pounds, 100,000 pounds and 200,000 pounds capacity, and five transverse and torsion testing machines are provided for determining strength, ductility, resilience and other characteristics of the various materials used in engineering work under the various stresses. Several forms of absorption and transmission dynamometers are available for determining the power generated by engines or other motors, or absorbed by shafting or machinery; coal and gas calorimeters for determining the heating value of fuels, and apparatus for the analysis of flue gases.

The laboratory is also provided with machines for determining the lubricating qualities of oils and the relative values of metals used for journals and bearings. There is in the laboratory a 35 horse-power boiler and a high pressure boiler capable of carrying a working pressure of 300 pounds, with the necessary gages, calorimeters, tanks and pyrometers for making complete duty trials; several automatic steam engines equipped with condensers, indicators, brakes, scales and thermometers, which are employed to determine the efficiency in the use of steam under various conditions assumed or found in actual practice, and for valve setting and indicator work.

The operation and economy of other heat engines are illustrated by an Otto gas engine of five horse-power, a White gasoline engine of eight horse-power, Rider and Ericsson hot air engines, a pulsometer, and several steam and power pumps. The laboratory also contains Pelton and Turk water motors, a water ram, injectors, weirs, nozzles, meters and other pieces of apparatus and instruments which an engineer is called upon to use in the course of his professional work.

In addition to the above, the equipment of the University power and lighting plant, described elsewhere, is available for the purposes of laboratory instruction.

A constantly increasing quantity of commercial testing is being done in connection with the regular work which brings the student into actual contact with the engineering world and affords him valuable experience and data for his future work.

MECHANICAL ENGINEERING

The plan of instruction in this course is intended to give the student a thorough training in mathematics and the physical sciences; and in the fundamental principles of engineering.

The work is planned to make him familiar with the various applications of these principles, and with the practical details of machine construction and design.

In the machine shops a three-ton crane covers a clear span of twelve feet, the entire length of the shop, thus giving ample space for erecting. This crane also serves some of the larger machine tools.

The foundry has been the subject of especial study and possesses many features of interest and value. In accordance with the best modern practice for light work the floor is of concrete, and the gangways, leading from the cupola and extending lengthwise of the room, are of heavy iron plates set in cement.

A light traveling crane is also provided for the foundry. This has a span of eighteen feet, and runs the entire length of the room.

The lighting, heating and ventilation of the building have received careful consideration. In the machine and pattern shops sixty per cent of the wall space above the benches is glass. In the foundry and forge shop less light is allowed, since an abundant supply of overhead light is obtained from windows placed in the lantern ventilator which extends over the roof. Pipe coils are employed in heating the building and these are placed partly on the side walls under the windows and partly overhead. Electric power is used for driving the machinery. The group system has been selected as the best adapted to the conditions, and a number of small motors are placed in the several departments; 220-volt continuous current motors are employed in connection with a three wire system of distribution, which is also used in the lighting circuit.

The machine shop contains representatives of the ordinary machine tools, gauges, and small tools usually found in a well-equipped modern plant.

The shop for pattern making and general wood work contains benches with vises and tools, lathes and lathe tools, an improved universal sawing machine, band saw, planer, jointer and other power tools, and all hand tools used in carpentry and pattern making.

The forge shop is equipped with stationary and portable forges, a blower and exhaust fan arranged on the down-draft system, a one-hundred pound drop hammer, and the necessary small tools used in blacksmithing.

The foundry contains a thirty-inch Whiting cupola, and two brass furnaces, which embody some novel features. There are two core ovens; one for ordinary work 3½x3½x5 feet, and one 3½x7x6 feet for special cores which may be required. The feature of these core ovens is that the gases and products of combustion are caused to traverse suitable conduits under a plate floor and do not come into direct contact with the cores. The usual moulding tools, ladles, crucibles, and all of the tools and materials needed in moulding and casting iron, brass or white metal, are provided.

The shop work is intended, not so much to give the student skill in the manual operations of the respective crafts, as a knowledge of the methods and processes of practical construction.

The new engineering power plant is admirably equipped with apparatus which constitutes a valuable part of the equipment.

THE LIBRARY of the department contains a collection of historic and recent works, the best standard books being purchased as soon as issued. There are a number of complete files of the transactions of engineering societies and of the leading technical publications. The reading room is amply supplied with both the general mechanical and railway press.

RAILWAY MECHANICAL ENGINEERING. Courses have been arranged for students wishing to specialize in this subject. The various courses may be elected separately, subject to the requirements for previous preparation, to fill out the electives, or options in the post senior year of any department.

Students planning to elect these courses are encouraged to work, under special arrangements, in railway shops during the summer vacations. This has proved its value as preparatory to the special work of the senior year. In every possible way the methods of the department are intended to place the students in touch with the best railway work, keeping always in sight the limitations which railway experience has found financially and practically to exist.

The location of the University is particularly favorable, being between the cities of St. Paul and Minneapolis in proximity to the shops, yards and headquarters of the extensive railway systems of the Northwest, which offers exceptional facilities for the prosecution of this work.

VISITS OF INSPECTION. During the year numerous visits are made to the manufacturing plants of St. Paul and Minneapolis, which have proven to be of great value in supplementing the class room work.

MUNICIPAL AND SANITARY ENGINEERING

The department is provided with the usual equipment for giving instruction in class-room, laboratory, and field, including a collection of drawings, photographs and models. The Engineering Department of the State Board of Health is in a position to furnish records of existing practice in Minnesota, thus providing a means of comparing progress in Minnesota and elsewhere; facilities are also offered for the prosecution of experimental work in sanitary lines under the direction of this board. Arrangements have been made with the Engineering Department of the State Highway Commission for co-operative work.

The special course in Municipal engineering now offered has been replaced by a sequence in optional subjects in the new five year course. Optional work in the application of hydraulic principles to problems of water power, river and harbor improvement is offered.

RAILWAY ENGINEERING

The aim of this department is to give the student a thorough working knowledge of railroad work, especial emphasis being laid upon the execution of practical problems, both in the field and drafting room. The department is fully equipped with the instruments necessary for carrying on an extended railroad survey.

STRUCTURAL ENGINEERING

This department has a collection of drawings of representative structures; photographs of prominent bridges, buildings and roofs, in this country and abroad; a well selected library of the best books and specifications upon structural engineering; slide rules and calculating instruments for rapid and accurate computations; and such other instruments as will facilitate the work of design.

Laboratories. Students in civil engineering have access to the laboratories and shops of the several departments in which their work lies. The Experimental Engineering laboratory offers excellent facilities for experimental work with cement and its products. In this connection there is a large Olsen testing machine of two hundred thousand pounds capacity, with automatic and autographic attachments, extension head for columns ten feet long, and transverse arms for twenty foot beams. Additional space and equipment are provided for experimental and research work.

Library. The civil engineering library is located on the first floor of the Mechanic Arts building. It contains all of the more important books and American and foreign periodicals relating to civil engineering. There are complete sets of the leading technical journals, proceedings and transactions of the engineering societies, and federal and state reports.

Inspection tours. The professional work in the several departments in civil engineering is illustrated in a practical manner by frequent class visits to the many engineering works and plants in the vicinity of Minneapolis and St. Paul.

Courses of Study

Figures at the left indicate credit hours; figures at the right indicate the course number. Letters at the right are abbreviations for the various courses, as follows:

Animal Biology	A. B.
Astronomy	A.
Botany	B.
Chemistry	C.
Civil Engineering	C. E.
Drawing and Descriptive Geometry	D
Economics	Ec.
Electrical Engineering	E. E.
English	E.
Experimental Engineering	Ex. E.
French and Spanish	F.
Geology and Mineralogy	G. M.
German Language and Literature	G.
Mathematics and Mechanics	M.
Mechanical Engineering	M. E.
Military Science	M. S.
Pathology and Bacteriology	P. B.
Physics	P.
Political Science	P. S.

CIVIL, MECHANICAL AND ELECTRICAL ENGINEERING

FRESHMAN YEAR

5	Mathematics, M. 1, 2.	Professor Haynes, Assistant Professor Newkirk, Mr. Frary
4	English, E. 1.	Professor Sanford, Mr. Nichols
4	Drawing, D. 1, 3, 2, 4.	Professor Kirchner, Mr. Rowley, Mr. Rose Mr. Clark
3	Shop M. E. 1, 2.	Mr. Shipley, Mr. Richards, Mr. Quigley
3	Modern Language, G. 1 or 4 or F. 1, 3 or 11.	Professor Moore, Professor Benton
3	Drill, M. S. 1.	Captain Sigerfoos

CIVIL ENGINEERING

SOPHOMORE

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Assistant Professor Erikson, Mr. Kovarik, Mr. McKeehan

3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language, G. 3 or 7; F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Animal Biology or Botany, A. B. 1 or B. 1.	Professor Nachtrieb, Professor Clements
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 4.	Professor Sidener
3	Surveying, C. E. 1.	Assistant Professor Bass, Mr. Cutler
3	Economics, Ec. 1.	Professor Robinson, Assistant Professor Rastall, Mr. Coulter
3	Architecture, D. 6.	Professor Kirchner

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 8.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Surveying, C. E. 2.	Assistant Professor Bass, Mr. Cutler
3	Astronomy, A. 1.	Professor Leavenworth
3	Transportation, Ec. 8.	Professor Robinson
3	Highways, C. E. 7.	Assistant Professor Bass

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
4	Surveying, C. E. 3.	Assistant Professor Bass, Mr. Cutler, Mr. Nelson
2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Geology, G. M. 1.	Assistant Professor Sardeson

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 21.	Professor Constant, Mr. Newhall
4	Railway Engineering, C. E. 9.	Mr. Cutler
2	Engineering Law, P. S. 6.	Mr. Allin
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop
3	Electric Power, E. E. 4.	Mr. Ryan

POST SENIOR YEAR

First Semester

5	Structural Design, C. E. 22.	Professor Constant, Mr. Newhall
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass, Mr. Newhall
5	Masonry, C. E. 25.	Professor Constant
4	Railway Engineering, C. E. 10.	Mr. Cutler
3	Experimental Laboratory, Ex. E. 8	Professor Kavanaugh
	or	
3	Water Analysis, C. 6.	Professor Frankforter
	or	
3	Railway Structures, C. E. 11.	Mr. Cutler

Second Semester

5	Structural Design, C.E. 23.	Professor Constant
4	Municipal Engineering, C. E. 6.	Assistant Professor Bass
3	Reinforced Concrete, C. E. 26.	Professor Constant
5	Thesis.	
4	Swing Bridges, C. E. 24.	Professor Constant
	or	
4	Bacteriology, P. B. 1.	Professor Wesbrook
	or	
4	Railway Economics, C. E. 12.	Mr. Cutler

MECHANICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

3	Mathematics, M. 5, 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7, 8.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 4, 7.	Professor Sidener, Assistant Professor Harding
3	Economics, Ec. 1, 8.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Mechanism and Kinematics, M. E. 11, 12.	Assistant Professor Martenis
4	Shop, M. E. 5, 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2	American Government, P. S. 13.	Professor Schaper, Mr. Allin
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
5	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
1	Boilers, M. E. 19.	Assistant Professor Martenis
3	Electric Power, E. E. 5.	Mr. Ryan

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Experimental Laboratory, Ex. E. 4.	Professor Kavanaugh, Mr. Shoop
2	Engineering Law, P. S. 6.	Mr. Allin
3	Steam Engines, M. E. 20.	Professor Flather
3	Machine Design, M. E. 14.	Professor Flather, Assistant Professor Martenis
2	Gas Engines, M. E. 21.	Mr. Herrick
3	Electric Power, E. E. 5.	Mr. Ryan

POST SENIOR YEAR

First Semester

3	Thermodynamics, M. 9.	Professor Eddy
3	Experimental Laboratory, Ex. E. 6.	Professor Kavanaugh
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Machine Design, M. E. 15.	Professor Flather, Mr. Herrick
	or	
4	Railway Design, M. E. 25.	Professor Flather
3	Heating and Ventilation, M. E. 23.	Assistant Professor Martenis
	or	
2	Railway Technology, M. E. 24.	Assistant Professor Martenis
2	Thesis	
	or	
2	Electrical Engineering, E. E. 10.	Professor Springer
3	Elective	

Second Semester

5	4 Turbines, M. 10, 11. 1 Specifications, M. E. 28.	Professor Eddy Professor Flather
	or	
5	3 Railway Problems and Administration, Ec. 9. 2 Railway Mech. Eng., M. E. 26.	Professor Robinson Professor Flather
4	Machine Design, M. E. 16.	Professor Flather and Mr. Herrick
	or	
4	Railway Design, M. E. 25.	Professor Flather, Assistant Professor Martenis

2	Mechanical Engineering, M. E. 22. or	Professor Flather
2	Locomotive Testing, M. E. 27.	Professor Flather
3	Gas Engine Laboratory, Ex. E. 9.	Professor Kavanaugh
3	Elective.	
3	Thesis.	

ELECTRICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 11.	Assistant Professor Martenis
3	Economics, Ec. 1.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Chemistry, C. 4.	Professor Sidener
4	Shop, M. E. 5.	Mr. Shipley

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
5	Physics, P. 8, 9.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 12.	Assistant Professor Martenis
3	Economics, Ec. 9A.	Professor Robinson, Assistant Professor Rastall, Mr. Phelan, Mr. Coulter
3	Applied Electricity, E. E. 1.	Professor Shepardson
3	Shop, M. E. 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk

2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
5	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Engineering Law, P. S. 6.	Mr. Allin
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall
3	Steam Engines, M. E. 20.	Professor Flather
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

POST SENIOR YEAR

First Semester

2	Alternating Currents, E. E. 6.	Professor Shepardson
3	Thermodynamics, M. 9.	Professor Eddy
2	Electrical Engineering Practice, E. E. 7, 8 or 9,	Professor Shepardson, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 14.	Mr. Ryan
2	Experimental Laboratory, Ex. E. 7.	Professor Kavanaugh
2	Thesis.	Professor Shepardson
3	Elective.	

Second Semester

3	Alternating Currents, E. E. 6.	Professor Shepardson
3	Electrical Engineering Practice, E. E. 8, 10, 11, 12.	Professor Shepardson, Professor Springer, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 15.	Mr. Ryan
2	Telephony, E. E. 12.	Professor Shepardson
	or	
2	Water Turbines, M. 10.	Professor Eddy
3	Thesis.	Professor Shepardson
3	Elective.	

Students desiring to specialize in electro-chemistry will be allowed to make certain substitutions in the senior and post senior years by approval of the faculty.

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

CIVIL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7'	Professor Eddy

3	Elective.	
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr.Shoop
4½	Curves and Earthworks, C. E. 9.	Mr. Cutler
3	Field Work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall

Second Semester

5	Mechanics, M. 8′.	Professor Eddy
3	Structural Details, C. E. 21.	Mr. Constant
3	Stresses, C. E. 20, 21.	Professor Constant, Mr. Newhall
5	Railway Engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Assistant Professor Sardeson
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 25.	Professor Constant
2	Experimental Laboratory, Ex. E. 8. or	Professor Kavanaugh
2	Railway Economics, C. E. 11.	Mr. Cutler
3	Electric Power, E.E. 4.	Mr. Ryan
5	Structural Design, C. E. 22.	Professor Constant
2	Political Science, P. S. 16.	Professor Schaper
4	Hydraulic Engineering, C E. 5.	Assistant Professor Bass
	Thesis.	

Second Semester

5	Structural Design, C. E. 23.	Professor Constant
3	Reinforced Concrete, C.E. 26.	Professor Constant
2	Transportation, Ec. 8.	Professor Robinson
3	Sanitary Engineering, C. E. 6.	Assistant Professor Bass
2	Contracts and Specifications, M. E. 28.	Professor Flather
5	Thesis.	

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

MECHANICAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a′.	Professor Eddy, Assistant Professor Newkirk
3	Physics, P. 2.	Professor A. Zeleny
3	Stresses, C. E.20.	Professor Constant
4	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr.Herrick
2	Experimental Lab., Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2½	Shop, M. E. 5.	Mr. Shipley
3	Electric Power, E. E. 5.	Mr.Ryan

Second Semester

5	Mechanics, M. 8'.	Professor Eddy, Assistant Professor Newkirk
3	Steam Engines, M. E. 20.	Professor Flather
4	Machine Design, M. E. 14.	Professor Flather, Assistant Professor Martenis
2	Gas Engines and Producers, M. E. 21.	Mr. Herrick
3	Experimental Lab. Ex. E. 2, 3.	Professor Kavanaugh, Mr. Shoop
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis
3	Electric Power, E. E. 5.	Mr.Ryan

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9'.	Professor Eddy
2	Water Turbines, M. 10*.	Professor Eddy
	or	
2	Railway Mech. Eng., M. E. 24.	Assistant Professor Martenis
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Steam Engine Design, M. E. 15.	Professor Flather
	or	
4	Gas Engine Design, M. E. 15.	Professor Flather, Mr.Herrick
3	Fuel and Gas Analysis, C. 7.	Assistant Professor Harding
2	Political Science, P. S. 16.	Professor Schaper
3	Experimental Lab., Ex.E. 6.	Professor Kavanaugh
	0 to 2 Elective. Subject to approval of department.	
	Thesis.	

Second Semester

2	Steam Turbines, M. 11'.	Professor Eddy
	or	
2	Railway Engineering, M. E. 25.	Professor Flather
	or	
2	Power Plant Design, M. E. 18.	Professor Flather
2	Contracts and Spec., M. E. 28.	Professor Flather
2	Transportation, Ec. 8.	Professor Robinson
4	Machine Design, M. E. 16.	Professor Flather, Mr. Herrick
	or	
4	Railway Design, M. E. 25	Professor Flather
4	Gas Engine Lab., Ex.E. 9.	Professor Kavanaugh
	2 to 4 Elective.	(As approved by Department)
3	Thesis.	

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*This course in the Water Turbines is a prerequisite to the course in Steam Turbines in the second semester, and all students desiring to take the latter course should not omit Water Turbines in the first semester. Senior Mechanical Engineers wishing to take Railway Mechanical Engineering may be allowed to substitute Railway Technology for Water Turbines but may, nevertheless, elect Water Turbines in preparation for Steam Turbines as an elective in the second semester. Senior Electrical Engineers may elect Water Turbines as preparation for Steam Turbines in the second semester if they desire to take Steam Turbines as an elective.

ORDER OF STUDIES FOR CLASSES GRADUATING 1910 AND 1911

ELECTRICAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a′.	Professor Brooke
3	Physics, P. 2.	Professor A. Zeleny
3	Stresses, C. E. 20.	Professor Constant
2	Electrical Machinery, E. E. 2.	Professor Springer
1	Electrical Laboratory, E. E. 17.	Professor Springer
1	Steam Boilers, M. E. 19.	Assistant Professor Martenis
4	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
2	Experimental Laboratory, Ex. E. 1	Professor Kavanaugh, Mr. Shoop

Second Semester

5	Mechanics, M. 8′.	Professor Brooke
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Steam Engines, M. E. 20.	Professor Flather
2	Machine Design, M. E. 13.	Professor Flather, Assistant Professor Martenis, Mr. Herrick
2	Electrical Design, E. E. 14.	Mr. Ryan
4	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9′.	Professor Eddy
3	Alternating Currents, E. E. 6.	Professor Shepardson
2	Electrical Engineering Practice, E. E. 7 to 12.	Professor Shepardson, Mr. Ryan
2	Political Science, P. S. 16.	Professor Schaper
4	Electrical Laboratory, E. E. 18.	Professor Springer
3	Experimental Laboratory, Ex. E. 7.	Professor Kavanaugh
3	Elective.*	
	Thesis.	

Second Semester

3	Alternating Currents, E. E. 6.	Professor Shepardson
2	Electrical Engineering Practice, E. E. 7 to 12.	Professor Shepardson, Professor Springer Mr. Ryan, Mr. Burch
2	Contracts and Spec., M. E. 28.	Professor Flather
3	Transportation, Ec. 8.	Professor Robinson
3	Electrical Design, E. E. 15.	Mr. Ryan
3	Electrical Laboratory, E.E 18.	Professor Springer
3	Elective.*	
3	Thesis.	

MUNICIPAL ENGINEERING

JUNIOR YEAR

First Semester

5	Mechanics, M. 7′.	Professor Eddy
3	Physics, P. 2 or Elective	
2½	Curves and Earthwork, C. E. 9.	Mr. Cutler
2½	Water Analysis, C. 6.	Professor Frankforter
2	Experimental Lab., Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Field Work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 20.	Professor Constant, Mr. Newhall

Second Semester

5	Mechanics, M. 8′.	Professor Eddy
3	Structural Details, C. E. 20, 21.	Professor Constant, Mr. Newhall
3	Stresses, C. E. 21.	Professor Constant, Mr. Newhall
5	Railway Engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Professor Sardeson
2	Hydraulic Lab., Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 25.	Professor Constant
2	Experimental Lab., Ex. E. 8.	Professor Kavanaugh
3	Electric Power, E. E. 4.	Mr. Ryan
5	Structural Design, C. E. 22.	Professor Constant
2	Political Science, P. S. 16.	Professor Schaper
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass

Second Semester

3	Biology, B. 13.	Assistant Professor Tilden
4	Bacteriology, P. B. 1.	Professor Wesbrook
5	Sanitary Engineering, C. E. 6.	Assistant Professor Bass
2	Transportation, Ec. 8.	Professor Robinson
2	Contracts and Spec., M. E. 28.	Professor Flather
3	Thesis.	

COURSE IN SCIENCE AND TECHNOLOGY

JUNIOR YEAR

First Semester

5	Mechanics, M. 7′.	Professor Eddy
3	Physics, P. 2.	Professor Zeleny
3	Drawing, D. 5.	Professor Kirchner
4	Technical Work.	
4	Elective Work.	

Second Semester

5	Mechanics, M. 8'.	Professor Eddy
3	Drawing, D. 5.	Professor Kirchner
5	Technical Work.	
7	Elective Work.	

SENIOR YEAR

12	Elective.
8	Technical Work.

Courses of Instruction

ANIMAL BIOLOGY

PROFESSOR NACHTRIEB, PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY

1. GENERAL ZOOLOGY — PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY

Six credits (four hours laboratory, two lectures per week)

First and second semesters

Open to sophomores, C. E. course.

This course is a comprehensive study of the principles of structure, physiology and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follows a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom; and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes and laboratory work. Text-book required, Hertwig's Manual of Zoology.

ASTRONOMY

PROFESSOR LEAVENWORTH, MR. BURNS

1. GENERAL ASTRONOMY — PROFESSOR LEAVENWORTH

Three credits (three hours per week) — Second semester

Open to juniors, C. E. course. Preparation: course M 4.

A study of the general principles of astronomy illustrated by lantern slides and telescopic observations. Lectures, recitations, problems in practical astronomy.

BOTANY

PROFESSOR CLEMENTS, ASSISTANT PROFESSOR TILDEN, ASSISTANT PROFESSOR ROSENDAHL, MR. HUFF

1. GENERAL BOTANY — PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL

Six credits (four hours laboratory, two lectures per week)

Open to sophomores, C. E. course. — First and second semesters

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

11. INDUSTRIAL BOTANY — ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) — Both semesters

Open to technical students who have completed course 1.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

13. WATER SUPPLY BOTANY — ASSISTANT PROFESSOR TILDEN
Three credits (six hours per week) — Second semester
Open to those who have completed course 1.

A technical course for municipal, sanitary and reclamation engineers involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.

14. TIMBER AND TIMBER DISEASES — MR. HUFF
Three credits (six hours per week) — First semester
Open to those who have completed course 1.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work, and references.

CHEMISTRY

PROFESSOR FRANKFORTER, PROFESSOR SIDENER, ASSISTANT PROFESSOR NICHOLSON, ASSISTANT PROFESSOR HARDING

3. QUALITATIVE ANALYSIS — ASSISTANT PROFESSOR NICHOLSON
Six credits (six hours per week) — First and second semesters
Required of all sophomores.

The course includes general reactions of the metals and their qualitative separation; reaction and identification of acids, followed by practical problems in qualitative analysis. Lectures and laboratory work.

4. CHEMISTRY OF MATERIALS OF ENGINEERING — PROFESSOR SIDENER
Three credits (one lecture or recitation and four hours laboratory per week)
First semester
Required of all juniors. Preparation: course 3.

Includes technical analysis of materials of engineering, with special references to iron and steel. Lectures and laboratory work.

5. VOLUMETRIC ANALYSIS — PROFESSOR SIDENER
First semester
Three credits. Preparation: course 3.

6. WATER ANALYSIS — PROFESSOR FRANKFORTER
Three credits — First semester
Optional, post senior year C. E. course.

Sanitary chemical analysis of water. Samples collected by the students tested for nitrogen in its several conditions, chlorine, color, turbidity, hardness.

7. FUEL AND GAS ANALYSIS — ASSISTANT PROFESSOR HARDING

The work includes an exhaustive chemical examination of fuels and the common gases, with a determination of their light and heat efficiencies. Lectures and laboratory work

CIVIL ENGINEERING

HYDRAULIC, MUNICIPAL AND SANITARY ENGINEERING; SURVEYING

ASSISTANT PROFESSOR BASS, MR. CUTLER, MR. NELSON

1. SURVEYING ASSISTANT PROFESSOR BASS, MR. CUTLER

Three credits, (six hours per week) First semester

Required of juniors, C. E. course.

Recitations, lectures and illustrative problems relating to chaining, field problems employing chain; methods of keeping field notes; determination of area—D. M. D. and rectangular coördinate method. Methods of laying out and dividing land, including the public land surveys of the United States. The care, proper use and adjustment of all instruments used are treated in field exercises. Chain, compass and transit surveys are made and circuits of level-lines run by each party. All surveys made in the field are platted and areas computed. Solution of problems and usual office reduction of all field notes.

2. SURVEYING AND TOPOGRAPHY MR. CUTLER, MR. NEWHALL

Three credits, (six hours per week) Second semester

Required of seniors, C. E. course.

Hydrographic, mining and municipal surveying. Use of plane-table, barometers: aneroid and mercurial. Determination of meridian by solar observation. Computation of earthwork.

3. TOPOGRAPHY ASSISTANT PROFESSOR BASS, MR. NEWHALL, MR. NELSON

Four credits, (eight hours) Second semester

Junior C. E. course. Preparation: course 1.

A complete topographical survey is made and platted. The survey consists of a triangulation, followed by stadia and sketching.

4 SURVEYING ASSISTANT PROFESSOR BASS

One credit, (one to two hours per week)

Elective, open to students in mechanical and electrical engineering courses.

A short course in the use, care and adjustment of surveying instruments.

5. HYDRAULIC ENGINEERING ASSISTANT PROFESSOR BASS

Four credits, (eight hours per week) First semester

Post senior C. E. course.

Lectures and recitations followed by field problems in municipal water supply. Water power, irrigation, land drainage and river and harbor improvements.

6. MUNICIPAL ENGINEERING ASSISTANT PROFESSOR BASS

Four credits, (eight hours per week) Second semester

Post senior C. E. course.

A continuation of course 5 in municipal water supply and sewerage Adaptation of various structures to the solution of problems of hydraulics and public hygiene. Maintenance and operation by municipal governments. House drainage, garbage disposal, heating and ventilating of public buildings, are also reviewed.

7. HIGHWAYS AND PAVEMENTS ASSISTANT PROFESSOR BASS

Three credits, (four to five hours per week) Second semester

Required of juniors, C. E. course.

Lectures, recitations and field work relating to the economics, location, construction and maintenance of public highways and pavements.

THESIS — ASSISTANT PROFESSOR BASS
Five credits, (ten hours per week) — Second semester
Post senior year.

Excellent opportunities are offered for experimental work through the connection of the department with the State Board of Health.

RAILWAY ENGINEERING

MR. CUTLER, MR. NELSON

9. RAILWAY ENGINEERING — MR. CUTLER, MR. NELSON
Four credits, (eight hours per week) — Second semester
Required of seniors, C. E. course.

Study of mathematics of curves and earthwork, with application to problems in location and construction. Especial emphasis is laid upon the execution in the field of practical problems. Text book required—Railroad Curves and Earthwork, Allen.

10. RAILWAY ENGINEERING — MR. CUTLER, MR. NELSON
Four credits (eight hours per week) — First semester
Post senior, C. E. course.

A continuation of course 9 with application to problems of the railroad spiral, switches, turnouts, overhaul, etc. A preliminary and final location survey is made of about four miles of relocation, including profiles, maps, mass diagrams, descriptions of right-of-way, and estimate of cost. Text-books,—Railroad Curves and Earthwork, Allen; Railroad Spiral, Searles.

11. RAILWAY STRUCTURES — MR. CUTLER
Three credits, (six hours per week) — First semester
Post senior C. E. course. Optional.

Recitations and drawing room work relating to the design and construction of railroad buildings and structures, such as wooden trestles, coaling stations, water stations, engine houses, etc. The object is to make the student familiar with all the principal structures which come under the supervision of the maintenance-of-way department of a modern railroad. Text-book—Track and Track Work, Tratman.

12. RAILWAY ECONOMICS — MR. CUTLER
Four credits, (four hours per week) — Second semester
Post senior, C. E. course. Optional.

Recitations and lectures covering the following subjects: economics of railroad location with a critical study of train resistance, influence of grade, curvature, distance, rise and fall, signaling, yards and stations, valuation of railroad property. Text-book, —Economics of Railroad Construction, Webb.

STRUCTURAL ENGINEERING

PROFESSOR CONSTANT, MR. NEWHALL

20 STRESSES IN FRAMED STRUCTURES — PROFESSOR CONSTANT, MR. NEWHALL
Three credits, (three hours per week) — First or second semester
Open to senior students pursuing the course in mechanics of materials.

Stresses in simple structures by graphic and algebraic methods. Mill building specifications and proportioning of parts. Design of roof trusses, simple beams, girders and roof truss bents. Recitations, problems and plates. Ketchum's Steel Mill Buildings. Handbooks of Steel Manufacturers.

21. **STRESSES IN FRAMED STRUCTURES** PROFESSOR CONSTANT, MR. NEWHALL

Three credits, (three hours per week) Second semester

Continuation of course 20, with special reference to stresses in bridge trusses under moving loads. Recitations, problems and plates. Burr and Falk's " Influence Lines "

22. **STRUCTURAL DESIGN** PROFESSOR CONSTANT

Five credits, (ten hours per week) First semester

Post senior. Open to students who have completed courses 20 and 21

Theory and design of steel structures, including mill buildings, railway and highway bridges, standpipes and towers and other problems of structural interest. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part III. Standard specifications.

23. **STRUCTURAL DESIGN** PROFESSOR CONSTANT

Five credits, (ten hours per week) Second semester

Post senior.

Continuation of course 22. With special reference to the design of steel railway bridges and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.

24. **SWING BRIDGES** PROFESSOR CONSTANT

Four credits, (eight hours per week) Second semester

Post senior, C. E. course. Optional.

Theory and design of swing and bascule bridges, with special attention to the design of the operating machinery. Moving structures. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part IV. Reference works on machine design. Students intending to take this course are advised to elect machine design, M. E. 18, first semester, senior year.

25. **MASONRY CONSTRUCTION** PROFESSOR CONSTANT

Five credits, (eight hours per week) First semester

Post senior. Preparation: course 20.

Foundations, design and use of cribs, cofferdams and pneumatic caissons, pressure of earth, design of retaining walls, piers, abutments, dams and chimneys. Properties of stones, bricks, cement and concrete. Recitations and lectures, two hours per week; drawing room work, six hours per week. Fowler's Deep Foundations; Taylor and Thompson's Concrete and Reinforced Concrete; Howe's Retaining Walls for Earth; and current periodical engineering literature.

26. **REINFORCED CONCRETE** PROFESSOR CONSTANT

Three credits, (six hours per week) Second semester

Post senior. Preparation: course 25.

Theory and design of reinforced concrete beams, slabs and columns; application of reinforced concrete to buildings, dams, retaining walls and arches. Lectures, problems and design. Turneaure and Maurer's Principles of Reinforced Concrete.

DRAWING AND DESCRIPTIVE GEOMETRY

PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE, MR. CLARK, MR. NELSON

1. **DRAWING** MR. ROSE, MR. CLARK, MR. NELSON

Three credits, (six hours per week) First semester

Required of all freshmen, in conjunction with course 3.

The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.

Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working-drawings.

2. **DRAWING** — MR. ROSE, MR. CLARK, MR. NELSON
Two credits, (four hours per week) — Second semester
Required of all freshmen. Preparation: courses 1, 3.
Continuation of course 1.

3. **DESCRIPTIVE GEOMETRY** — PROFESSOR KIRCHNER
One credit, (one hour per week) — First semester
Required of all freshmen. Open to students pursuing course 1.

Central projection and special cases; principles and applications. Representation of lines, planes and solids, and of their relations; tangencies, intersections and developments.

Recitations, lectures and the solution of problems.

4. **DESCRIPTIVE GEOMETRY** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Two credits, (two hours per week) — Second semester
Required of all freshmen.
Preparation, courses 1, 3.
Continuation of course 3.

5. **DRAFTING** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Six credits, (six hours per week) — First and second semesters
Required of all sophomores. Preparation: courses 2, 4.

Graphics, machine drafting, structural drafting, and topography. Instruction in drafting room methods.

(a) Civil engineering course.
(b) Mechanical and electrical engineering courses.

6. **ELEMENTS OF ARCHITECTURE** — PROFESSOR KIRCHNER
Three credits — First semester
Required of juniors, C. E. course. Preparation: course 5.

The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.

7. **TECHNICAL DRAWING** — PROFESSOR KIRCHNER, MR. NELSON
Six credits (six hours per week) — First and second semesters
Required of freshmen, analytical chemistry course.

Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings and translations.

FOR GRADUATES

10. **DESCRIPTIVE GEOMETRY AND APPLICATIONS**
11. **PROJECTIVE GEOMETRY**
12. **PERSPECTIVE**

ECONOMICS

PROFESSOR GRAY, PROFESSOR ROBINSON, ASSISTANT PROFESSOR RASTALL, MR. PHELAN, MR. COULTER

1. **ELEMENTS OF ECONOMICS** — PROFESSOR ROBINSON, ASSISTANT PROFESSOR RASTALL, MR. PHELAN, MR. COULTER

Three credits, (three hours per week) First or second semester

A thorough course in the elements of economic theory, with special reference to present day economic and social problems.

McVey's Outline and a text-book, supplemented by lectures and problems, with a weekly quiz.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION PROFESSOR ROBINSON

Three credits, (three hours per week) Second semester

Required of juniors. Preparation: course 1.

A general course on the history and theory of transportation and communication, with special reference to the United States. Early routes and methods of migration and commerce. Causes determining the location of railways. Effect of steam and electricity in the consolidation of industries and of nations.

Signal systems, the post, telegraph and telephone. Parcels post and express service. Economic functions and relations of highways, interurban electric lines, steam railways, inland waterways and ocean transportation. The organization of ocean commerce.

Lectures, assigned readings and discussions.

9. RAILWAY PROBLEMS AND ADMINISTRATION PROFESSOR ROBINSON

Three credits, (three hours per week) Second semester

Required, post senior year, railway M. E. course, preparation: course 9 A.

An advanced course devoted to the study of railway problems and administration, including: (1), conditions effecting economy of operation; (2), passenger and goods traffic; (3), economic principles underlying the making of railway rates; (4), competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5), the great railway systems of the United States; (6), regulation by the states and the federal government; (7), government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings and special topics.

ELECTRICAL ENGINEERING

PROFESSOR SHEPARDSON, PROFESSOR SPRINGER, MR. RYAN, MR BURCH, MR. GRANT

1. APPLIED ELECTRICITY PROFESSOR SHEPARDSON

Three credits, (three hours per week) Second semester

Required of juniors E. E. course.

Preparation: course P. 5.

Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

2. ELECTRICAL MACHINERY PROFESSOR SPRINGER

Six credits, (six hours per week) First and second semesters

Preparation: courses E. E. 1, P. 5, 6, and M. 5, 6.

Electrical engineering measuring instruments and their use; units; theory of dynamo electric machinery; methods of regulation; construction and operation of generators and motors; methods of testing.

4. ELECTRIC POWER MR. RYAN

Three credits, (four hours per week) First or second semester

Required of seniors, C.E. course and School of Mines. Preparation: courses P. 5, 6.

Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting. Twenty-four lectures and recitations and forty-eight hours laboratory. Text-book: Norris, Introduction to the Study of Electrical Engineering.

5. ELECTRIC POWER — MR. RYAN

Six credits, (four hours per week) — First and second semesters

Required of seniors, M. E. and Chemical courses. Preparation: courses P. 5, 6.

An elementary study of the electrical problems involved in the generation, distribution, measurement and utilization of power. Lectures, recitations and laboratory work, supplemented by numerous practical problems. Text-book: Franklin and Estey, Elements of Electrical Engineering Practice.

6. ALTERNATING CURRENTS — PROFESSOR SHEPARDSON

Four and six credits, (two or three hours per week) First and second semesters

Post senior year. Preparation: courses 1, 2.

Phenomena, measurement and use of alternating currents; theory of line, transformer, generator and motor; types of apparatus.

Text-book: Steinmetz, Alternating Current Phenomena.

7. ELECTRICAL ENGINEERING PRACTICE. Batteries — MR. RYAN

One credit, (one hour per week) — First semester

Post senior year. Preparation: course 2.

General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Text-book: Lyndon, Storage Battery Engineering.

8. ELECTRICAL ENGINEERING PRACTICE. Lighting — PROFESSOR SHEPARDSON

One credit, (one hour per week) — First semester

Post senior year. Preparation: course 2.

Comparison of different sources of light; photometry; physics of the arc; history, design and regulation of arc lamps; adaptation to constant current, constant potential and A. C. circuits; carbons; history, manufacture and economy of incandescent lamps; distribution of light.

9. ELECTRICAL ENGINEERING PRACTICE. Central Stations — MR. RYAN

Two credits, (two hours per week) — First or second semester

Post senior year. Preparation: courses 2, 6.

Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas and water power; location, design and erection of station buildings; boilers, engines, dynamos, storage batteries, switch board and lines; operation and regulation; maintenance of plant; emergencies; examination of stations in Minneapolis and St. Paul.

10. ELECTRICAL ENGINEERING PRACTICE. Railways — MR. BURCH

One credit, (one hour per week) — Second semester

Post senior year. Preparation: course 2 or 4.

History and development; different systems of distribution; location and calculation of feeders; line and track construction; choice of motors, trucks, generators and engines; operation and repairs Text-book: Gotshall, Electric Railway Economics.

11. ELECTRICAL ENGINEERING PRACTICE. Transmission — PROFESSOR SHEPARDSON

One credit, (one hour per week) — Second semester

Post senior year. Preparation: courses 1, 2, 5.

Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current; constant potential and alternating systems; design of line; study of particular plants.

12. ELECTRICAL ENGINEERING PRACTICE. Telegraph and telephone
PROFESSOR SHEPARDSON
One or two credits, (one or two hours per week) Second semester
Post senior year. Preparation: courses 1, 5.

Various systems and instruments used in local and long distance telegraph and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.

13. ELECTROCHEMISTRY PROFESSOR SHEPARDSON
One or two credits (one or two hours per week) First or second semester
Post senior year .

Theoretical and experimental study of electrolytic and electrothermal processes.

14. ELECTRICAL DESIGN MR. RYAN
Three credits, (six hours per week) First semester
Post senior year. Preparation: courses P. 1, 2, E. E. 1, 2, and M. E. 13.

Problems in designing circuits, electro-magnets and dynamos; complete working drawings and specifications to accompany each design.

15. ELECTRICAL DESIGN MR. RYAN
Three credits, (six hours per week) Second semester
Post senior year. Preparation: courses 6, 14.

Design of a transformer, switchboard and other problems.

16. ELECTRICAL DESIGN MR. RYAN
Two credits, (four hours per week) Second semester
Post senior year. Preparation: courses 8, 14.

Designs, specifications and estimates for an electric light or power plant.

17. ELECTRICAL LABORATORY PROFESSOR SPRINGER
Six credits, (six hours per week) First and second semesters
Senior year. Preparation: courses P. 5, 6, and E. E. 1, 2.

Tracing circuits and locating faults; electrical engineering measurements; calibration of instruments; operation and characteristic curves of generators and motors. Lectures and practice.

18. ELECTRICAL LABORATORY PROFESSOR SPRINGER
Six credits, (six hours per week) First and second semesters
Post senior year.

Experimental study of alternating currents; regulation and efficiency tests of alternators, transformers, motors and rotaries; photometric tests of incandescent and arc lamps. Lectures and practice.

19. ELECTRICAL LABORATORY PROFESSOR SHEPARDSON, PROFESSOR SPRINGER
One or two credits, (two or four hours per week) First or second semester
Post senior year. Efficiency tests and special problems.

20. ELECTRICAL ENGINEERING MEASUREMENTS PROFESSOR SPRINGER
Application of measurements to electrical engineering practice.
Lectures and laboratory.

21. **POWER PLANT OPERATION** ASSISTANT PROFESSOR RYAN, ASSISTANT PROFESSOR MARTENIS, MR. DIXON

One or two credits, (equivalent to two or four hours per week)
First or second semester

Post senior year, elective.

Practice in operation and care of gas producer, gas engine, boilers, engines, turbines, dynamos, battery, switchboards and auxiliary apparatus of the University lighting plant.

22. **JOURNAL READING** PROFESSOR SHEPARDSON

Two credits First and second semesters

Post senior year.

Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of the American Institute of Electrical Engineers.

23. **PRECISE ELECTRICAL ENGINEERING MEASUREMENTS** PROFESSOR SPRINGER

Preparation: course 19.

Lectures and laboratory work. Precise measurements of resistance, voltage, current, self-induction and capacity; standardization of measuring instruments. Open to limited number subject to approval.

24. **ILLUMINATING ENGINEERING** PROFESSOR SHEPARDSON

Lectures and laboratory work. Investigation of performance of electric and gas lamps, reflectors and diffusers; luminous efficiency, distribution, color characteristics, physiological phenomena, methods of determining location, kind and quality of lights for obtaining desired illumination.

25. **TELEPHONE ENGINEERING** PROFESSOR SHEPARDSON, PROFESSOR EDDY

Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus; lines and line phenomena, including induction, transposition, loading coils, etc.

26. **ALTERNATING CURRENT PHENOMENA** PROFESSOR SHEPARDSON

Lectures and laboratory work. Study of wave forms, transient phenomena, oscillographic investigations; tests of apparatus.

Candidates for the degree of electrical engineer are required to take courses 1, 2, 6, 14, 15, 17, 18, also 68 hours class room work selected from courses 7 to 13.

NOTE—Electives may be chosen from any courses given in the academic or engineering colleges for which the student has sufficient preparation. Attention is called to the following as desirable for electrical engineers.

Botany—Timber and timber diseases.

Chemistry—Quantitative analysis, fuel and gas analysis, electro-chemical analysis.

Civil engineering—Short course in surveying for seniors; masonry and construction, structural details; hydraulic engineering; railway economics.

Drawing—Advanced work.

Electrical engineering—Any courses not taken as required work (except 3, 4, and 5)

Geology—Mineralogy.

Language—English, French, German, Spanish.

Mathematics—Theory of turbines, hydraulic motors and wind engines; circular hyperbolic and elliptic functions; wave theories of light, heat and electricity; directional calculus, vector analysis, differential equations, least squares.

Mechanical engineering—Measurement of power, air compressors and motors, shop work, heating and ventilation, machine design, railway technology, experimental laboratory, gas engines and producers.

Military science.

Physics—Advanced work on special problems.

Political science and economics—Money and banking, corporation finance, public finance, accounting, industrial problems.

ENGLISH

PROFESSOR SANFORD, MR. NICHOLS

1. ENGLISH — PROFESSOR SANFORD, MR. NICHOLS
Eight credits, (four hours per week) — First and second semesters
Required of all freshmen.

This course is planned with special reference to the needs of engineering students. Two hours a week will be given to the study of English composition, and two hours to the study of a general survey of English literature. Essays will be required every week.

While in the study of literature one object will be the general broadening of the mind by an acquaintance with the masterpieces of English prose and poetry, especial attention will be given to the work of those writers who have handled scientific subjects with clearness and power.

EXPERIMENTAL ENGINEERING

PROFESSOR KAVANAUGH, MR. SHOOP

1. MATERIALS TESTING LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — First semester
Required of seniors. Open to those pursuing course M. 7.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

2. STEAM LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — Second semester
Required of senior E. E. Open to those pursuing course M. E. 20.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

3. HYDRAULIC LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Two credits, (lecture and laboratory) — Second semester
Required of senior C. E. Open to those pursuing course M. 8.

Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps and other hydraulic apparatus.

4. EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH, MR. SHOOP
Three credits — Second semester
Required of senior M. E. Open to those pursuing courses M. 8 and M. E. 20.
Special modification of courses 2 and 3.

5 EXPERIMENTAL LABORATORY — PROFESSOR KAVANAUGH
Two credits — Second semester
Required of senior miners

Special modification of courses covering work in hydraulic measurements, gas and steam engine and boiler testing.

6. EXPERIMENTAL LABORATORY PROFESSOR KAVANAUGH
Three credits First semester
Required of post senior M. E. Preparation: course 4.
Calibration of dynamometers and measurement of power.
Testing lubricating value of oils. Tests of injectors and ejectors. Tests of of steam-turbines, steam-engines and boilers, and complete power and lighting plants.

7. EXPERIMENTAL LABORATORY PROFESSOR KAVANAUGH
Two credits First semester
Required of post senior E. E. Preparation: courses M. 8 and M. E. 20.
Hydraulic measurements. Tests of water motors, rams, steam and power pumps. Measurement of power. Tests of gas and steam engines, boilers and complete power and lighting plants.

8. EXPERIMENTAL LABORATORY PROFESSOR KAVANAUGH
Three credits First semester
Elective for post seniors. Preparation: course 1. Tests of the properties of cements, concrete and reinforced concrete. Strength of beams, columns, joints and framed structures.

9. GAS ENGINE LABORATORY PROFESSOR KAVANAUGH
Three credits Second semester
Required of post senior M. E. Preparation: courses M. E. 21 and Ex. E. 6. A continuation of course 6, also tests of gas, gasoline and hot-air engines; gas producers, air compressors, automobile and locomotive testing and special work.

10. EXPERIMENTAL LABORATORY PROFESSOR KAVANAUGH
Two or four credits Second semester
Elective for post seniors. Special research work and commercial tests.

FOR CLASSES GRADUATING IN 1910 AND 1911

1. MATERIALS TESTING LABORATORY; two credits. Required of juniors First semester
2. STEAM LABORATORY; two credits. Required of juniors, E. E. and School of Mines. Second semester
3. HYDRAULIC LABORATORY; two credits. Required of juniors, C. E.
4. EXPERIMENTAL LABORATORY; three credits. Required of juniors, M. E. Second semester
5. EXPERIMENTAL LABORATORY; two credits. Required of seniors, School of Mines. Second semester
6. EXPERIMENTAL LABORATORY; three credits. Required of seniors, M. E. First semester
7. EXPERIMENTAL LABORATORY; three credits. Required of seniors, E. E. First semester
8. EXPERIMENTAL LABORATORY; two credits; (elective) First semester
9. GAS ENGINE LABORATORY; four credits, required of seniors, M.E. Second semester
10. EXPERIMENTAL LABORATORY; two or four credits (elective) Second semester

Description and prerequisites of the above courses as previously stated.

FRENCH AND SPANISH

PROFESSOR BENTON, PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN,
MR. MELOM

1. BEGINNING — PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN

Six credits (three hours per week) — First and second semesters

Open to freshmen.

Fraiser and Squair's *French Grammar and Reader*, modern texts.

2. INTERMEDIATE FRENCH — PROFESSOR ANDRIST

Six credits (three hours per week) — First and second semesters

Prequisite, course 1.

Francois, *Advanced French Prose Composition:* modern texts will be read, including some of the works of Merimee, Daudet, Scribe, etc.

3. ADVANCED FRENCH GRAMMAR AND COMPOSITION — PROFESSOR ANDRIST

Six credits (three hours per week) — First and second semesters

Open to all who enter the University with two years of French.

Francois' *Introduction to French Composition:* readings from modern authors, including selections from Coppee, Feuillet, and Sandeau.

5. THE CLASSICAL PERIOD OF FRENCH LITERATURE — PROFESSOR BENTON

Six credits (three hours per week) — First and second semesters

Open to those who have completed course 2 or 3.

The reading of works and selections produced during the classical period of French literature, and conversations in French concerning the same. The works of Corneille, Racine, Moliere, La Fontaine, etc. Compositions.

11. BEGINNING SPANISH — MR. MELOM

Six credits (three hours per week) — First and second semesters

Monsanto and Languellier *Spanish Course-Josselyn.* Worman, First Spanish Book. Bransby's Spanish Reader.

12. INTERMEDIATE SPANISH — MR. MELOM

Six credits (three hours per week) — First and second semesters

Open to those who have completed F. 11.

First semester; Loiseaux, Spanish Composition. Brownell, *El Payaro Verde.*

Second semester: Gray's *Fortuna:* Alcaro's *El Captain Veneno.*

GEOLOGY AND MINERALOGY

PROFESSOR HALL, ASSISTANT PROFESSOR SARDESON

1 GEOLOGY — ASSISTANT PROFESSOR SARDESON

Three credits (three hours per week) — First semester

Required of seniors C. E. course.

A condensed course in physical and historic geology, for civil engineers. Geodynamics, structural geology, physiography, stratigraphic and historical geology are treated successively. Excursions to typical localities will supplement work done in the class room. Lectures and references.

GERMAN LANGUAGE AND LITERATURE

PROFESSOR MOORE, ASSISTANT PROFESSOR JUERGENSEN, ASSISTANT PROFESSOR BURKHARD, MR. WISCHKAEMPER

1. **BEGINNING** ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. WISCHKAEMPER

Six credits (three hours per week) First and second semesters

Open to all.

Pronunciation, grammar, conversation and composition; selected reading in easy prose and verse.

3b. **SCIENTIFIC INTERMEDIATE** ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. WISCHKAEMPER

Six credits (three hours per week) First and second semesters

Prerequisite, course 1.

This course is arranged to meet the peculiar needs of engineering students.

Text: Merckel's *Bilder aus der Ingenieurtechnik.*

4. **PROSE AND POETRY** PROFESSOR MOORE, ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD, MR. WISCHKAEMPER

Six credits (three hours per week) First and second semesters

Open to all who enter the University with two years of German.

Meissner's *Aus deutschen Landen:* Goethe's *Gedichte:* Heine's *Buch der Lieder.* Geography, history and legend. Review of German grammar throughout the year This course may be supplemented.

7. **ADVANCED SCIENTIFIC READING** ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD

Six credits (three hours per week) First and second semesters

Open to all who have taken course 3 or 4. Reading of scientific monographs and periodicals.

8. **SEMINAR IN SCIENTIFIC READING** ASSISTANT PROFESSOR JUERGENSEN

Two credits (two hours per week)

Open to graduate students, and by permission of the department, to undergraduates who have completed course 7 or 9.

1909–10, the literature of evolution (Haeckel, Reinke et al).

1910–11, Psychology and philosophy (Windt etc).

MATHEMATICS AND MECHANICS

PROFESSOR EDDY, PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

The ability to understand and apply mathematical processes readily is regarded as essential to the engineer. The aim of these courses is to cultivate this ability so far as possible. To this end special emphasis is laid upon two things: elucidation of principles and drill upon their applications, as furnishing the only sure basis for a thorough technical and professional training Courses 1 to 8 inclusive must be taken in the order indicated, and in order to enter upon the work of any year the student must have attained a passing mark on all the required courses in preceding years.

1. Higher Algebra and Analytical Trigonometry Professor Haynes,
Assistant Professor Newkirk, Mr Frary
Five credits (five hours per week) First semester

Required of all freshmen. Theory of exponents, series, undetermined coefficients, determinants, theory of equations, graphs, logarithms, trigonometric transformations.

2. Plane and Spherical Trigonometry and Analytical Geometry to Conic Sections Professor Haynes, Assistant Professor Newkirk, Mr. Frary
Five credits (five hours per week) Second semester.

Required of all freshmen. Properties of plane triangles and their solution by logarithmic tables and the slide rule; general properties and solution of spherical triangles; introduction to analytical geometry, transformation of co-ordinates, the right line and circle.

3. Analytical Geometry of Two and Three Dimensions
Professor Haynes, Professor Brooke
Four credits (four hours per week) First semester

Required of all sophomores. Conic sections and other loci; the point, line, plane and quadric.

4. Differential and Integral Calculus Professor Haynes,
Professor Brooke
Four credits (four hours per week) Second semester

Required of all sophomores. Differentiation and integration, expansion in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing.

5. Calculus and Mechanics Professor Haynes, Professor Brooke,
Assistant Professor Newkirk
Three credits (three hours per week) First semester

Required of all juniors. Integration; rectification, quadrature, cubature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.

6. Analytical Mechanics Professor Haynes, Professor Brooke,
Assistant Professor Newkirk
Three credits (three hours per week) Second semester

Required of all juniors. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics, courses 1 to 5 inclusive.

Statics and dynamics, rectilinear, circular and harmonic motion, and curvilinear motion in general, dynamics of rigid bodies, impact, work and energy.

7. Strength and Resistance of Materials Professor Eddy,
Professor Brooke, Assistant Professor Newkirk
Prerequisite, course 6.
Four credits (four times per week) First semester

Required of all seniors. Mechanical and elastic properties of materials of construction; beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, plates; theory of internal stress.

8. Hydraulics and Pumping Machinery Professor Eddy,
Professor Brooke, Assistant Professor Newkirk
Prerequisite, course 6.
Four credits (four times per week) Second semester

Required of all seniors Laws of equilibrium, pressure and flow of liquids; theory of the action of pumps.

9. THERMODYNAMICS OF STEAM AND GAS ENGINES — PROFESSOR EDDY
Three credits (three times per week) — First semester

Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including use of steam tables, entropy diagrams. etc.

10. WATER TURBINES — PROFESSOR EDDY
Two credits (two times per week) — Second semester

Required of all candidates for degrees in mechanical and electrical engineering except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.

11. STEAM TURBINES — PROFESSOR EDDY
Two credits (two times per week) — Second semester

Open to all who have had course 9 and are pursuing course 10.

Various types of turbines, velocity, impulse, and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.

12. REFRIGERATING MACHINERY — PROFESSOR EDDY
Two credits (two hours per week) — Second semester

Open to those who have had course 10. The course will be given when a sufficient number apply.

Ammonia compression and absorption machines, compressed air, carbonic acid, etc.

FOR GRADUATES

Courses in the following related subjects in mathematics, mathematical physics and theoretical mechanics are open to those who have had sufficient preparation, but they are primarily intended for graduates.

13. Differential Equations.
14. Analytical Statics and Potential Functions
15. Spherical Harmonics
16. Theory of Electricity and Magnetism
17. Analytical Theory of the Conduction of Heat
18. Theory of Elasticity and Sound
19. Electro-magnetic Theory of Light
20. Hydrodynamics and Fluid Motion
21. Dynamics of Rigid Bodies
22. Elliptic Functions
23. Theory of Functions of the Complex Variable
24. Directional Calculus, Vector Analysis, Determinants
25. Kinetic Theory of Gases

FOR CLASSES GRADUATING 1910, 1911

7'. STRENGTH AND RESISTANCE OF MATERIALS — PROFESSOR EDDY
Five credits, (five hours per week) — First semester

Required of all juniors in the civil engineering course. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics of the two preceding years. Bars, beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers and plates and the general theory of internal stress.

7a′. APPLIED MECHANICS PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Five credits, (five hours per week) First semester

Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as for course 7′. The principles of statics and dynamics, and the mechanics of the matherials of construction.

8′. HYDRAULICS AND PUMPING MACHINERY PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Five credits, (five hours per week) Second semester

Required of all juniors. Prerequisite, course 7′ or 7a′. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

9′. THERMODYNAMICS OF STEAM AND GAS ENGINES PROFESSOR EDDY
Three credits, (three hours per week) First semester

Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8′. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including the use of steam tables, entropy diagrams, etc.

10′. WATER TURBINES PROFESSOR EDDY
Two credits, (two hours per week) First semester

Required of all candidates for degrees in mechanical and electrical engineering, xcept those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.

11′. STEAM TURBINES PROFESSOR EDDY
Two credits, (two hours per week) Second semester

Open to all who have had courses 9′ and 10′. Various types of turbines, velocity, impulse and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.

12′. REFRIGERATING MACHINERY PROFESSOR EDDY
Two credits (two hours per week) Second semester

As previously stated.

MECHANICAL ENGINEERING

PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS, MR. SHIPLEY, MR. RICHARDS, MR. HERRICK, MR. PETERSON, MR. QUIGLEY, MR. UBRICH

SHOP WORK

1. CARPENTRY AND PATTERN MAKING MR. RICHARDS
Four credits (six hours per week, twenty-four weeks)
First and second semesters

Required of all freshmen.

Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.

2. BLACKSMITHING MR. SHIPLEY AND MR. QUIGLEY
Two credits (six hours per week, twelve weeks) First and second semesters

Required of all freshmen.
Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.

3. Foundry Practice Mr. Peterson
Three credits (six hours per week) First and second semesters
Required of all M. E. and E. E. sophomores.
Moulding, casting, mixing metals, brass work and core making.
Shop practice, recitations and lectures.

4. Machine and Bench Work Mr. Shipley
Three credits (six hours per week) First and second semesters
Required of all M. E. and E. E. sophomores.
Chipping, filing, machine work. Lectures and practice.

5. Tool Construction Mr. Shipley
Four credits (eight hours per week) First semester
Required of juniors, M. E. course. Preparation: course 5.
Tools, taps, reamers, cutters and other special work. Lectures and practice.

6. Machine Construction Mr. Shipley
Four credits (eight hours per week) Second semester
Required of juniors, M. E. course. Preparation: course 5.
Gear cutting, finishing, machine construction. Lectures and practice.

7. Carpentry, Joinery and Wood Carving Mr. Richards
Four credits (eight hours per week) First or second semester
Open to all students.
A course in wood working designed with special reference to the needs of teachers of manual training.

8. Machine Construction Mr. Shipley
Four credits (eight hours per week) First or second semester
Elective. Open to seniors.
Construction of patterns and machine work for special apparatus or machinery designed by the students.

9. Shop Economics Professor Flather
Two credits (two hours per week) Second semester
Senior elective.
Shop and factory organization and management; cost systems.

10. Power Plant Operation Assistant Professor Martenis, Assistant Professor Ryan, Mr. Dixon
One credit (equivalent to two hours per week) First or second semester
Elective, post senior year.
Operation and maintenance of gas producers, gas engines, boilers, engines, steam turbines and accessory apparatus. Smoke prevention.

MACHINE DESIGN

11. Principles of Mechanism Assistant Professor Martenis
Three credits (three hours per week, lectures and recitations) First semester
Required of juniors, M. E. and E. E. course. Preparation: course M. 4.
The transmission of motion without consideration of the strength of parts. Gear wheels, linkages, belts, screws, epicyclic trains, parallel motions, quick-return movements.

12. **KINEMATICS AND ELEMENTARY MACHINE DESIGN**
ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) Second semester
Required of juniors, M. E. and E. E. courses. Preparation: course M 4.

Graphical diagrams of the paths, speeds and accelerations of important mechanisms; centroids, analysis of mechanisms; construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.

13. **MACHINE DESIGN** PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Five credits (ten hours per week) First semester
Required of seniors, M. E. and E. E. courses. Open only to students pursuing course M. 7.

Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures and drawing-room practice.

14. **MACHINE DESIGN** PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) Second semester
Required of seniors, M. E. course. Open only to those pursuing course 20.

Continuation of course 13. Rope driving; bevel gears, spiral gears. Also application of graphical methods to the design of valve-gears and link motions. Zeuner diagrams, indicator cards. Lectures and drawing-room practice.

15. **MACHINE DESIGN** PROFESSOR FLATHER
Four credits (eight hours per week) First semester
Required, post senior year, M. E. course. Preparation: courses 14, 19.

Steam engine. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details.

Gas engine. An alternative course in gas engine design is offered those who have completed course 21.

16. **MACHINE DESIGN** PROFESSOR FLATHER
Four credits (eight hours per week) Second semester
Required, post senior year, M. E. course. Preparation: course 13.

Original designing, including machinery for changing size and form. Boiler design, cranes, pumping and transmission machinery and engineering appliances. Lectures, problems and drawing-room practice.

17. **TOOL DESIGN** PROFESSOR FLATHER
Two to four credits (four or eight hours per week) First or second semester
Post senior year, elective.
Preparation: courses 6, 13.

Design of special tools for manufacturing interchangeable parts; jigs and milling fixtures.

18. **ENGINEERING DESIGN** PROFESSOR FLATHER
Two or four credits (four or eight hours per week) First or second semester
Elective. Preparation: courses 19, 20.

Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer gas plants; choice of engines and boilers; water powers; power distribution, dynamos and motors; pumps, shafting, piping and accessory plant.

STEAM ENGINEERING AND PRIME MOVERS

19 **STEAM BOILERS** ASSISTANT PROFESSOR MARTENIS
One credit (one hour per week) First semester

Senior year. Open only to students pursuing course M. 7.

Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

20. STEAM ENGINE — PROFESSOR FLATHER
Three credits, (three hours per week) — Second semester
Senior year. Preparation: course M. 7.

Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

21. GAS ENGINES AND PRODUCERS — MR. HERRICK
Two credits, (two hours per week) — Second semester
Senior year.

Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.

A study of the power-gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

22 MECHANICAL ENGINEERING — PROFESSOR FLATHER
(a) Two credits (two hours per week) — First semester
Post senior. Preparation: course M. 8.

Measurement of power. A study of the methods employed in measuring power. Dynamometers. Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors, power required to drive machine tools and shafting. Recitations and lectures.

(b) Two credits (two hours per week) — Second semester
Elective, post-senior. Preparation: course M. 8.

Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. MECHANICAL ENGINEERING — ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) — First semester
Elective. Post senior year.

Heating and ventilation. Principles of heating and ventilation. Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum and fan systems. Lectures, recitations and design.

Seminar. Open to seniors and post seniors once a week.

RAILWAY MECHANICAL ENGINEERING

The following courses are available to students desiring to preparethemselves for special work in railway engineering.

24. RAILWAY TECHNOLOGY — ASSISTANT PROFESSOR MARTENIS
Two credits (four hours per week) — First semester
Post senior. Railway M. E. course.

The object of this course is to familiarize the student with the practical details of construction of locomotives, and consists in part of a systematic course of visits to the various railroad shops in the vicinity; lectures and recitations.

25. RAILWAY DESIGN — PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Eight credits (eight hours per week) — First and second semester
Post senior. Preparation: course 24.

(a) Of link and valve motions. Continuation of course 12, with special applications of the Stephenson link.

(b) Of locomotives and car details.

(c) Of the locomotive boiler.

(d) Of assembled parts.

26. LOCOMOTIVE CONSTRUCTION — PROFESSOR FLATHER
Two credits (two hours per week) — Second semester
Post senior. Preparation: course 24.

Lectures, reading and recitations on design and construction of locomotives, supplementing course 24. This treats,

(a) Of parts not involving the boiler and the use of steam; but including the carriage, as frames, springs and equalizing arrangements, running gear, brakes, trucks, lubrication.

(b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks, riveted joints, bracing and staying. Lagging, smoke prevention.

(c) Of the locomotive engine. Details, heat insulation, cylinder proportion for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.

27. LOCOMOTIVE ROAD TESTING — PROFESSOR FLATHER
Post senior. — Second semester

28. SPECIFICATIONS — PROFESSOR FLATHER
One credit (one hour per week) — Second semester
Post senior year, M. E. course.

A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications.

FOR GRADUATES

Courses offered in:

Engineering design.
Experimental investigation.
Railway engineering.

PHYSICS

PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK, MR. MCKEEHAN

5. MECHANICS OF SOLIDS AND FLUIDS — PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK, MR. MCKEEHAN
Four credits (three recitations, one lecture or two hours laboratory) — First semester
Open to those who have completed courses M. 1, 2.

Required of sophomores.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.

6. HEAT, MAGNETISM AND ELECTROSTATICS PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) Second semester

Open to those who have completed course 5.

Required of sophomores.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS PROFESSOR JONES, PROFESSOR J. ZELENY, PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) First semester

Open to those who have completed course 6. Required of juniors.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) Second Semester

Open to those who have completed course 5. Required of juniors.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

9. ADVANCED ELECTRICAL MEASUREMENTS PROFESSOR A. ZELENY

One credit (two hours laboratory work) Second semester

Open to those who have completed course 7.

Required of juniors, E. E. course.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities.

FOR CLASSES GRADUATING IN 1910–1911

The mathematics of the freshman year is required as preparation for all courses in this department.

2. ELECTRICAL MEASUREMENTS PROFESSOR A. ZELENY

Three credits (one lecture or recitation and four hours laboratory per week)
First semester

Advanced Laboratory Work — Professor John Zeleny
Open to those who have completed course 2.

MILITARY SCIENCE AND TACTICS

1. Military Drill — Captain Sigerfoos
(Three hours per week) — First and second semesters

Drill is required of all men in the freshman and sophomore classes.

Freshman—Practical instruction in schools of the soldier, company and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore—Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

For instruction in military drill and administration the students are organized into a corps of cadets, consisting of four batallions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about $15.

Millitary drill may be taken voluntarily by others outside of the freshman and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

2. Millitary Science — Captain Sigerfoos
(Two hours per week) — Second semester
Optional with the seniors and juniors.

Junior, senior—Theoretical instruction—Advance and rear guards, outposts reconnaissance, camping, duties of company commander, articles of war, records.

This work when satisfactorily completed taken in connection with the year's drill will give a four-hour credit for the semester.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obediance to lawful authority, as well as to familiarize students with company and battalion manoeuvers, guards and the theoretical and practical use of firearms.

On graduation of each class the Commandant will report to the Adjutant General of the Army the names of the graduates who have shown special aptitude for the millitary service and furnish a copy thereof to the Adjutant General of the State.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment and able to pass a creditable examination in drill regulations. In general, the officers are selected from the senior class; the sergeants from the junior class and the corporals from the sophomore class.

PATHOLOGY AND BACTERIOLOGY

PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL

1. **BACTERIOLOGY** — PROFESSOR WESBROOK

(Four credits) — Second semester

Post senior C. E. course, optional.

Brief course in general bacteriology. Preparation of media and study of cultures, especially those of pathogenic bacteria found in water and sewage.

POLITICAL SCIENCE

PROFESSOR SCHAPER, MR. ALLIN

16. **AMERICAN GOVERNMENT** — PROFESSOR SCHAPER, MR. ALLIN

Two credits, (two hours per week) — First semester

Required of all seniors.

An introductory course in political science. It includes a study of the organization and present workings of our national, state and local government, and serves as an introduction to course 6.

6. **ENGINEERING LAW** — MR. ALLIN

Two credits (two hours per week) — Second semester

Required of all seniors. Preparation: course 16.

A course in the elements of law especially designed for engineering students. It includes a study of the system of federal and state courts, the jury system, the law of contracts, corporations, partnerships and limited partnerships, administrative law, the rights and duties of citizenship, and some leading features of the law of real and personal property and the law of riparian rights.

C
DEPT. OF AGRICULTURE
The College of Agriculture

The College of Agriculture

FACULTY

Cyrus Northrop, LL.D., President.
John W. Olsen, B.S., Dean.
Samuel B. Green, B.S., Professor of Horticulture and Forestry.
Harry Snyder, B.S., Professor of Soils.
T. L. **Haecker**, Professor of Dairy Husbandry and Animal Nutrition.
M. H. **Reynolds**, B.S., M.D., D.V.M., Professor of Veterinary Medicine and Surgery.
Andrew Boss, Professor of Agriculture and Animal Husbandry.
Frederick L. Washburn, M.A., Professor of Entomology.
William Boss, Professor of Farm Structures and Farm Mechanics.
Edward Sigerfoos, Ph.B., LL.B., Professor of Military Science and Tactics, Captain Fifth United States Infantry.
E. M. **Freeman**, Ph.D., Professor of Vegetable Pathology and Botany.
John T. Stewart, B.S., Professor of Agricultural Engineering and Physics.
D. D. **Mayne**, Professor of Agricultural Pedagogics, Principal of the School of Agriculture.
Fannie C. Boutelle, Domestic Economics, Preceptress.

ASSISTANT PROFESSORS

C. P. **Bull**, B. Agr., Assistant Professor of Agriculture.
E. G. **Cheyney**, A.B., Assistant Professor of Forestry.
John A. Hummel, B. Agr., Assistant Professor of Agricultural Chemistry.
D. A. **Gaumnitz**, M.S. Agr., Assistant Professor of Animal Husbandry.
R. C. **Lansing**, M.A., Assistant Professor of English.
C. C. **Lipp**, D.V.M., Assistant Professor of Veterinary Medicine and Surgery.
Edw. K. Slater, Assistant Professor of Dairy Husbandry.
J. P. **Wentling**, M.A., Assistant Professor of Forestry.

INSTRUCTORS

L. B. Bassett, Agriculture.
Margaret J. Blair, Domestic Art.
A. M. Bull, Drawing.
Mary L. Bull, Domestic Science.
Le Roy Cady, B.S., Agr., Horticulture.
Henrietta Clopath, Freehand Drawing.
T. P. Cooper, B.S. Agr., Agriculture.
Josephine Craig, Agricultural Chemistry.
J. M. Drew, Registrar, Blacksmithing, Poultry.
J. L. Edmunds, B.S. Agr., Animal Husbandry.
Henry J. Franklin, Ph. D., Entomology.
W. H. Frazier, B.S., Soils.
G. P. Grout, B.S. Agr., Dairy Husbandry.
Avis C. Hall, Domestic Art.
W. F. Handschin, Animal Husbandry.
D. B. Howell, Animal Nutrition.
A. R. Kohler, B.S.A., Horticulture.
May McDonald, Domestic Science.
Karl A. Machetanz, B.A., Director of Gymnasium and Coach
Martha B. Moorhead, M.D., Lecturer in Domestic Science
J. L. Mowry, Farm Structures and Farm Mechanics.
W. S. Oswald, Botany.
C. A. Pyle, B.S., D.V.M., Verterinary Science.
H. B. Roe, B.S., Eng'r, Mathematics; Engineering.
A. G. Ruggles, M.A., Entomology.
Juniata L. Shepperd, M.A., Domestic Science.
Anna M. Smith, Librarian.
Edith Staples, Domestic Art.
H. J. Thom, Blacksmithing.
J. A. Vye, Farm Accounts.
H. B. White, B.S. Agr., Carpentry.
Grace B. Whitridge, Physical Training.
A. D. Wilhoit, M.A., Soils.

General Information

REQUIREMENTS FOR ADMISSION TO ALL COURSES IN THE COLLEGE OF AGRICULTURE

All applicants for admission to the undergraduate courses of the College of Agriculture are required to take an examination in writing, punctuation, spelling, and grammar. This rule applies to all applicants, whether with or without certificates from accredited schoools, and to those who seek entrance to advanced standing on credits from other colleges or normal schools. Those who fail to pass the examination will be required to study elementary English for an hour a week until the deficiency is removed.

The examination will be given in the Short Course room, Main Building, College of Agriculture, at 9 o'clock A. M., Wednesday, Sept. 15, 1909. Any who have passed the entrance examination in English given in May by the College of Science, Literature and the Arts will be excused from this test.

Graduates of the School of Agriculture, who have completed the studies prescribed in the intermediate course or fourth year, and **graduates of approved high and normal schools,** as approved by the committee on entrance requirements and course of study, are admitted to the freshman class in the courses in the College of Agriculture; the former to Division "A", and the latter to Division "B".

Agricultural students taking courses in the College of Science, Literaature and the Arts, or in other colleges of the University, are required to conform to rules published in the bulletins of the respective colleges.

Students from other colleges and universites: Graduates from other colleges and universities may be admitted upon presentation of certificates, and will receive credit from the several professors for all work satisfactorily completed of similar character and grade to that given in this college.

Special students: Graduates of the School of Agriculture mav be admitted as special students and be allowed to pursue such studies in the course offered in the College of Agriculture as are approved by the faculty.

All students in the College of Agriculture must advise with the dean or the committee on college and graduate work concerning all electives. No student is allowed to enter any course until such course is properly entered upon the student's registration card by the registrar of the Agricultural Department, and no credit shall be given for subjects in which the student has not been previously registered.

Registration of subjects. No student shall be permitted to register in any course for more than twenty-five credit hours, nor for less than fifteen credit hours, in any one semester, without permission of the Dean of the Department.

REQUIREMENTS FOR GRADUATION AND DEGREES

After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to a total of 163 credit hours, students in the course in agriculture will be recommended for graduation with the degree of Bachelor of Science in Agriculture, students in the course of forestry with the degree of Bachelor of Science in Forestry, and students in Home economics with the degree of Bachelor of Science in Home Economics.

Diplomas of graduates of the College of Agriculture who have taken specified courses in the College of Education are valid as first-grade professional certificates for two years, and at the expiration of two years of successful teaching, such diplomas, properly endorsed, have the force of first-grade professional certificates for life.

The teachers' course offers two years of work in home economics, equivalent to 83 credit hours. This leads to a diploma, but not to a degree.

Diplomas issued to graduates of the teachers' course are valid as first-grade certificates for two years. At the expiration of two years of successful teaching, such certificates, properly endorsed, have all the force of first-grade certificates for life.

The elective studies designated as academic are to be chosen from the printed semester programs of work offered in the colleges of Science, Literature and the Arts; Law; Medicine; and Engineering; no student to take more than two semesters in either of the three last named collges. The elective studies designated as agricultural are to be chosen from the printed program of work offered in the College of Agriculture.

GRADUATE WORK

Special facilities are offered to graduate students from this and other agricultural colleges who wish to become familiar with methods employed in experment station work, and to pursue their collegiate studies further.

Courses for major and minor subjects may be arranged by consulting the professors in the different divisions. Students who enter for advanced degrees, register with the committee on registration of the College of Agriculture and also in the Graduate School. They must take their major subjects in the College of Agriculture, but they may take one or both of their two minor subjects in the College of Science, Literature and the Arts or in the College of Engineering and Mechanic Arts. Graduate students registered in the Graduate School may take one or both of their minor subjects in the College of Agriculture.

I. The degree of Master of Science in Agriculture will be conferred on a bachelor of this or any other agricultural college of equal grade who, not sooner than one year after graduation, if a resident graduate student at this agricultural college, shall pass an examination in certain prescribed lines of study and present a satisfactory thesis in accordance with the requirements of the Graduate School.

II. All general regulations of the Graduate School governing candidates for the master's degree, method of selecting work, amount of work required, degree of proficiency expected, and the time and manner of conducting the examinations, apply to candidates for master's degrees in the College of Agriculture.

III. The Degree of Doctor of Science will be conferred by the Graduate School for study in the College of Agriculture on bachelors of this or any other agricultural college of equal grade within not less than three years after graduation therefrom under conditions prescribed by the faculty of the Graduate School.

FEES

All students in the college, who are residents of the State of Minnesota, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, or twenty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage. A Gymnasium Fee of twenty-five cents per semester will be collected of each student. This fee constitutes the athletic fund, which is used in procuring such apparatus as the school does not provide.

DAILY ROUTINE

The daily session is divided into eight recitation periods of forty-five minutes each, four in the morning and four in the afternoon. The morning session begins at. 8:15 and closes at 11:30. A general assembly of the faculty and students is held at 11:40 o'clock. The noon hour extends from 12:15 to 1:15 o'clock. The afternoon session begins at 1:15 o'clock and continues until 4:30. Work extends through six days of the week.

ORGANIZATIONS

Home Economics Club. The object of this club is the study of home economics in all its relations. It is open to students in the home economics course, and is especially helpful to its members.

Philomathian Literary Society is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating and parliamentary practice. The society meets once a week and presents a program including readings, recitations, debates, etc. Membership is limited to forty and is only for students in the College of Agriculture.

The Forestry Club was organized by the Forestry students for the promotion of good fellowship and mutual interests. The specific object of the club is to keep the members up to date on Forestry Literature and current affairs in forestry.

PUBLICATIONS

Forestry Publication.—The "Minnesota Forester" is the official organ of the Minnesota State Forestry Association. It is edited by the Forestry Department of the University and is devoted to the advancement of the forestry movement with special emphasis on farm forestry.

Minnesota Farm Review.—This paper is published and managed by the Alumni of the Alumni Association of the School of Agriculture. It is the official organ of the Alumni Association and the Farmer's Club. The **Review** is intended to be a medium through which former students may keep in touch with the Agricultural School and with one another. It also endeavors to bring the farmers of the State into closer touch with the school, the college, and the Experiment Station. To this end, the paper strives to present the latest progress in the experimental work of the various stations and to call attention to the most practical farm practices.

GIDEON MEMORIAL FUND

In honor of Peter M. Gideon, the pioneer in developing new fruit and the originator of the Wealthy apple, the Minnesota State Horticultural Society has raised a fund of five hundred dollars, which has been placed with the Board of Regent for investment. The income from this fund is to be expended by the Professor of Horticulture of the University of Minnesota for prize essays on some suitable horticultural subject. This prize money will be awarded at the close of each year.

ARMOUR SCHOLARSHIP

Through the exhibits of live stock at the International Exhibition in 1908, the College of Agriculture has been awarded one of the J. Ogden Armour Scholarships, amounting to $250.00, which is to be awarded to some worthy student in the Agricultural College. This scholarship will be available during the next college year.

LIBRARY

The Agricultural Library is well equipped for supplying the needs of both under-graduate and graduate students. It contains nearly 15,000 volumes of general and technical literature, Government reports, etc., besides 4,000 unbound pamphlets, bulletins and reports. The general subject and author card index and the index of publications of the State Experiment Stations are always at the disposal of students to aid them in locating the various sources of information which the Library affords.

There are complete sets of all standard encyclopaedia and dictionaries and files of over 225 popular and technical magazines and periodicals.

The Librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

COURSE IN AGRICULTURE

The course in agriculture is designed to give the student a broad education in the sciences and arts relating to agriculture and to fit him for the work of the agricultural specialist. The physical and biological sciences are made prominent. The work in these subjects is begun in the first or second year and may be continued throughout the course. For the first two years, the lines of study are prescribed, the subjects being chosen with a view of giving a good foundation for the work which follows. For the last two years, some elective work is offered, giving the student an opportunity to take work along certain lines for which he has a special aptitude and liking.

Six months' practical farm experience is required of each cadidate for graduation. It is expected that the work be done on some accredited farm on which improved methods and appliances are in use. This work can be performed during the summer vacations under the guidance of the head of the division in which the student is specializing.

In the College of Agriculture a portion of the work is taken in the College of Science, Literature and the Arts. All academic electives and the prescribed work in geology, German, French, botany, zoology, psychology, English literature, economics and education are taken in the College of Science, Literature and the Arts. The agricultural electives and the prescribed subjects not mentioned above are taken at University Farm.

The classes in the College of Agriculture begin with the opening of the regular University year (for which see calendar).

AGRICULTURE

Equipment. The equipment for instruction in agriculture consists of the following: Special laboratories and class rooms with modern apparatus for all courses, collections of classes and varieties of all field and weed seeds; herbariums of weeds and grasses indigenous to the state; a germinating room which affords opportunity for a study of the vitality and strength of seeds; charts and models of various details of crops together with bulletins on farm management, the cost of farm production, and other pertinent topics supplement the daily lectures; machinery used on University Farm and generously loaned by the firms of the Twin Cities afford valuable subjects for instruction work. The fields and plots of the Experiment grounds offer additional facilities and subjects for use in class work. The student's home and farm is at all times made the basis of his particular study.

The State Grain Inspection department, elevators, mills and adjoining farms of the Twin Cities and vicinity furnish a study for the merchandizing of grains and the planning of farms. An agricultural museum, now being equipped, will contain much material that will be instructive and historic, and serve to show the close relations of agriculture and the modern industries.

Standard references upon agriculture are provided for an exhaustive study of any branch of this subject and original research is a prominent factor of the agricultural course.

AGRICULTURAL CHEMISTRY

Nature of Courses. All students are required to take courses 1, 3 and 4. Students in the course of Home Economics also take courses 2, 5, 6 and 7. Course 6 is required of students in the agricultural course. This course can be taken either with or without the laboratory course No. 7. Course 5 is required of all students before taking any of the more advanced laboratory work.

Equipment. A special laboratory with modern apparatus for the analysis of foods and agricultural products is provided. The equipment contains a Berthelot-Atwater calorimeter for the determination of the caloric value of foods, vacuum ovens, apparatus for the chemical and microscopical analysis of foods and the necessary facilities for human and animal food investigations. Special facilities are offered in testing wheat, flour and cereal products for commercial purposes. Nutrition investigations, including the digestibility of foods, the chemical changes which take place in cooking, and the losses in the preparation of foods form a part of the Experiment Station work. This offers an opportunity for students to study methods of investigation relating to human food problems. Laboratory practice is also offered to advanced students in the study of household problems in which chemistry is involved. Special classes are also formed for the study of dietarv problems. Standard reference books and journals, including Jahresbericht der Agricultur Chemie, Comptes Rendus, Biedermann's Centralblatt, Annales de la Science Agronomique and Versuchs-Stationen are provided for the advanced work in agricultural chemistry.

Fees. In all the laboratory courses in agricultural chemistry a fee is charged to cover the cost of material used, and breakage. In qualitative analysis the student pays the same fee as required of other students in the College of Science, Literature and the Arts. The student is assigned a certain amount of apparatus and material for which he gives a receipt, and deposits $3.00 with the accountant before beginning work. All apparatus returned in good condition at the close of the term is credited to the student's account upon settlement.

ANIMAL HUSBANDRY

Equipment. Representatives of some of the leading breeds of cattle, sheep and swine, are kept at University farm and herds of blooded stock near the institution and the annual show of live stock at the state fair serve for extended observation of breeds and methods of management. Each year a number of experiments are under way in the feeding of these classes of animals. Breeding experiments are also undertaken with sheep and swine, and theoretical experiments with the smaller animals. Experiments in summer feeding cattle, sheep and swine wholly or in part on pasture are carried on each year. The new live stock building affords excellent accommodations for class work in stock judging.

ANIMAL NUTRITION

The work in Animal Nutrition offered to students of the College of Agriculture is laid out as a four years' course leading to the dergee of Bachelor of Science in Agriculture.

The economic relation of foods to the kinds and character of energy expended by the animal body is a subject of vital importance to live stock owners. It is a subject which has received no small amount of time in experiment work from the dairy division of this institution. The facilities in the way of laboratory equipment, as well as numerous animals for experiment purposes, are adequate for giving students a thorough scientific training in this subject. The dairy herd and some sixty head of nutrition steers are constantly kept for investigation work.

Great stress is laid on chemical, biological and physical phenomena affecting these problems, and to this end a thorough training in this science is given.

AGRICULTURAL ENGINEERING

This division does not offer a course that will make expert draftsmen or engineers as in an engineering college. Its object is to combine in each of the courses offered such features of engineering as will enable the student to perform the more simple engineering operations which may occur in the work of his chosen course, and will further prepare him to understand the principles underlying the more complicated problems of engineering, and thus enable him to properly interpret plans and specifications, and to carry on investigations in connection with engineers.

As this division is new, the equipment is somewhat limited; however, there are now available two plane transits, three levels, and a number of smaller instruments, with which it will be practical to solve such field problems as the time alloted for this work will permit. Charts and photographs are being gradually acquired by which the more advanced problems in physics, drainage and roads can be demonstrated.

DAIRY HUSBANDRY

Equipment. Students in the college course have the advantages of the equipment of the dairy school. The feeding and breeding experiment in the dairy divsion of the experiment station serves a most useful purpose in the collegiate instruction. The cordial relations existing between the department of agriculture and other state institutions are often advantageous to college students well advanced in dairy work.

Specimens of several breeds of cattle are kept for class use. Herds in the vicinity and those shown at the state fair are useful to sudents in this course.

This course is designed to meet the needs of those desiring a thorough knowledge of dairying. It will equip graduates for responsible positions as managers of large butter and cheese factories, stock farms, or for positions as instructors in dairy schools. Applicants must have had at least three months' experience in a creamery or cheese factory, for which three credit hours are allowed.

ENTOMOLOGY

Equipment. Well lighted laboratories with modern equipment are at the disposal of college students for both undergraduate and graduate work. Instruction is further aided by an excellent series of charts and lantern slides. The department is well equipped with museum specimens convenient to the lecture room, showing not only a large series of insects injurious and otherwise, over 10,000 specimens, but also birds and other animals which have a direct bearing upon agriculture. A good museum is also a valuable auxiliary in instruction and friends of the institution are urged to contribute specimens which illustrate the animal resources of the state. Excellent facilities for the installing and caring for specimens are offered.

In economic work the student is brought into direct contact with spraying apparatus and insecticides. Practical work in bee keeping is offered in our apiary, and experiments in insect life can be carried on by advanced students in the insectary at nearly all seasons of the year.

A course in Insects and Diseases is offered in view of the fact that of late years various insects or insect-like animals have been found to play a very important and hitherto unrealized part as carriers and transmitters of disease, and thus have a very important bearing upon the health of man.

Laboratory Fees: To cover cost of material, breakage, etc., a fee of three dolars is charged each student in the course in Forest Entomology, and two dollars in Economic Entomology, the amount of the fee being deposited with the accountant before beginning work.

FARM STRUCTURES AND FARM MECHANICS

Lectures and practicums are given in designing and in construction of farm houses, farm barns, silos, out-buildings and conveniences; cement floors, walls, troughs; farm water systems, wells, cisterns, tanks, house heating and plumbing systems, and in painting farm buildings.

Equipment. Students taking this subject have the advantage of many practical examples in designing and in construction of farm buildings.

The buildings on the campus, such as farm house, barns, dairy buildings, greenhouses, live stock pavilion, sheep barns, swine barns, and silos, and the water, sewer and heating systems are available for this work.

Many new residence buildings being erected in the vicinity of the campus afford excellent opportunities for special studies in modern home construction.

The aim is to fit the student to be able to design, estimate the cost of, and construct such buildings as are best adapted to most farm conditions.

FORESTRY

Graduate and under-graduate courses are offered in forestry. These prepare men to take charge of private forest property, for the Government Forest Service, or for positions as teachers.

The graduate course may be completed in two years, and requires college training for admission. Graduates of universities, colleges, or scientific institutions of high standing, are admitted to the graduate course upon presentation of their diplomas, provided they have had courses in elementary botany, general geology, inorganic chemistry, physics, mathematics through trigonometry, economics and modern languages. Those who complete the graduate course in forestry receive the degree of Master of Science in Forestry.

The under-graduate course requires four years for its completion, and leads to the degree of Bachelor of Science in Forestry.

Although it is a course leading to a technical degree in a specialized science, it is nevertheless based on broad enough lines to afford a good general scientific education. The forester in his lonely life in the woods is very frequently thrown largely upon his own resources and should be capable of obtaining pleasure and interest out of all his surroundings. For this reason an attempt is made to give the student in addition to a thorough training in technical forestry, a good working knowledge of all the sciences and other lines of study which touch upon his life in any way.

Special emphasis is laid on the value of field work and excursions. Every student is required before graduation to take four weeks' work in some lumber camp, so as to become familiar with common lumbering operations. There will also be excursions to nearby forests, to lumber camps, saw mills, wood manufacturing and paper mills; to the Boom Company's work on the Mississippi river; to nearby nurseries; and it is expected that arrangements will be made which will afford an opportunity for students to visit some of the forests of Montana, Idaho and Washington, at a very low rate.

Equipment. The vast lumbering operations in the northern part of Minnesota offer the best opportunities for a study of that branch. The establishment of the Chippewa Forest Reserve and its management by the Forest Service give opportunities which few other sections possess to study the best methods of forest management. The state has twenty-one thousand acres of timber to be used as a forest and game preserve, on which student help will be largely used. Itasca State Park, 22,000 acres in extent, is used by the Forest School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forest School a forest equipment which is unsurpassed anywhere.

Throughout the year, special lectures will be given by the State Forestry Commissioner, the State Game Warden, the State Fish Commissioner and prominent lumbermen and lumber manufacturers of Minneapolis and St. Paul. This touch with the commercial side of the lumber business is very important and the situation of the school makes it possible to offer a great deal of it. Other special lectures will be offered as opportunity offers.

HORTICULTURE

Equipment. The work in the division of horticulture is mainly carried on at University Farm. About twenty acres is here used for the field work in this line. The horticulture building furnishes excellent facilities for class room and laboratory exercises. The special work in breeding and testing fruits is carried on at Zumbro Heights, Carver County, where eighty acres of land are devoted to this purpose and equipped with suitable greenhouse, storage cellar, barns, etc., affording excellent facilities for this line of investigation.

The campus of the School of Agriculture is planted out with a collection of trees, shrubs, and herbaceous plants suitable for this section, the specimens of which are labeled with their common and botanical names. The parks, greenhouses, orchards and nurseries of the near vicinity afford convenient and satisfactory illustrations of the best commercial methods and ornamental planting. Our facilities in this line are unexcelled, perhaps, by any other college in the country.

The greenhouses, laboratories and class rooms of the division of horticulture are well equipped with modern apparatus. The division library contains a large number of horticultural works and is further supplemented by a card index to all its literature.

HOME ECONOMICS

The work in home economics offered in the College of Agriculture is a four year course leading to the degree of Bachelor of Science in Home Economics, and is open to graduates from the School of Agriculture who have taken the work of the intermediate year, and to graduates of approved high and normal schools. It is intended to bring to the vocation of home making the same kind of help which the course in agriculture brings to the business of farming. Aside from the universal need of education of this character, there is a marked and increasing demand for trained women to fill institutional and administrative positions as competent supervisors of supplies and of hygiene where large numbers are cared for in collective housekeeping, as well as for special teachers in the several divisions of home economics.

Lectures at the University Training School for Nurses are open to seniors. The course opens during the second semester and consists of the elements of nursing, dietetics, etc. Due credit will be allowed for all work taken.

Graduates of other reputable colleges can here secure a Bachelor's Degree by devoting two years to the subject of Home Economics. The major work must be done in Home Economics, and one or both of two minors must be completed under the advice of the college committee in one of the other divisions of the College of Agriculture, or in the College of Science, Literature and the Arts. When approved by the dean and college committee, other subjects given in these colleges may be substituted for the prescribed subjects in the course in home economics.

Women who are sufficiently advanced may study music or art during the junior or senior years, provided that no student may receive more than two semesters' credit in music and-art together.

TEACHERS' COURSE IN HOME ECONOMICS

In addition to the four year course, a two year teachers' course is offered in home economics, which includes all the special technical subjects given in the four year course in the College of Agriculture at the University Farm, but does not include all the required general cultural studies of this course.

Teachers' Certificate. Diplomas issued to graduates of the Teachers' Course are valid as first grade certificates for two years. At the expiration of two years of successful teaching, such certificates, when properly endorsed, have the force of first grade certificates for life.

SOILS

Nature of Courses. Students in the Agricultural course are advised to take courses 1 and 2. Course 3 is optional and can be taken either with or without course 2. Students who elect course 3 are required to have previously taken course 5 in Qualitative Analysis.

Equipment. The department is equipped with laboratories for elementary and advanced students. A large collection of soils from Minnesota and other states are available for purposes of study, including soils that have been under short and long periods of cultivation where different systems of farming have been practiced. Special facilities are offered for the study of the organic matter of the soil and its influence upon the chemical and physical properties of soils. The laboratory is provided with appartaus for the physical and chemical analysis of soils and for the study of special problems in relation to soil fertility. The library contains many of the standard periodicals and reference books upon soils and fertilizers. As soil investigations and a study of the soil areas of the state form a feature of the Experiment Station work, opportunity is offered for practical experience in the study of soil problems in relation to crop production.

Fees. Students pay a laboratory fee of $3.00 for course 3; this is to cover cost of chemicals and materials used. Students also pay the cost of all breakage of apparatus intrusted to their care.

VEGETABLE PATHOLOGY AND BOTANY

Equipment. The work of this division is designed to assist the student in correlating the fundamental facts and theories of botany and the practical problems of agricultural and horticultural work. The laboratories, library, and demonstration material are well arranged and equipped to enable the student to accomplish this correlation. The greenhouse and the abundant facilities of observing plant life on the grounds and station farm furnish further excellent facilities. The plant and seed collections, including especially the plant diseases, are made useful to the student. A special field for diseases and weed investigation is maintained on the station farm. Problems of agricultural botany and plant disease work are features of the division.

VETERINARY MEDICINE AND SURGERY

Equipment. The veterinary building gives ample facilities for good work. The hospital furnishes cases for study and demonstration and the dissecting room affords material and opportunity for studying the digestive organs, anatomy of cow formation and type, and locomotor apparatus. A large and well stocked museum contains ample material for illustration.

Instruction is given by text books, lectures, collateral reading, and by practice work. The lectures are illustrated by means of stereopticon, skeletons, manikins, charts and by the living animal. Anatomy of locomotion, conformation, the digestive organs, and the higher physiology of digestion are given prominence.

Infectious diseases of domestic animals are studied with reference to causes, recognition, prevention and methods of control. Certain medicines which the intelligent stockman should understand are studied with reference to uses and methods of administration.

OUTLINE OF COURSE IN GENERAL AGRICULTURE

DIVISION "A"

GRADUATES OF SCHOOL OF AGRICULTURE

	Credit Hours	Lecture Hours	Laboratory Hours
Freshman Year			
First Semester			
General Botany or Zoology (1)	3	2	4
Beginning German or French (1)	3	5	
General Rhetoric (1)	3	3	
Elements of Economics (1)	3	3	
General Geology (1)	3	3	
Physical Geography (2)	3	3	
Total credits	18		
Second Semester.			
General Botany or Zoology (1)	3	2	4
Beginning German or French (1)	3	5	
General Rhetoric (1)	3	3	
Trigonometry (1)	3	3	
General Chemistry (3)	3	3	3
Industrial Geography (Geol. 3)	3	3	
Total credits	18		

DIVISION "B"

NOT GRADUATES OF SCHOOL OF AGRICULTURE

	Credit Hours	Lecture Hours	Laboratory Hours
Freshman Year.			
First Semester.			
General Botany or Zoology (1)	3	2	4
Beginning German or French (1)	3	5	
Soils and Fertilizers (1)	2	2	4
Agronomy (1)	2	3	
Study of Breeds and Types (An. Husb. 1)	2	2	2
Fruit Growing (Hort. 1)	1½	3	
Entomology (1) (First half Sem)	½	3	
Veterinary Work (1)	2	3	
Farm Mechanics (Farm Struc 1)	2		6
Military Drill			3
Total credits	18		
Second Semester.			
General Botany or Zoology (1)	3	2	4
Beginning German or French (1)	3	5	
Chemistry of Plant and Animal Life (1)	2	2	4
General Chemistry (3)	2	2	4
Trigonometry (1)	2	3	
Dairy Husbandry (10)	2	2	4
Poultry (An. Husb. 2) (First half Sem)	1	3	
Farm Mechanics (Farm Struc. 1)	2		6
Plant Propagation (3) (Last half Sem)	1	1	2
Military Drill			3
Total credits	18		

	CREDIT HOURS	LECTURE HOURS	LABORATORY HOURS
SOPHOMORE YEAR.			
FIRST SEMESTER.			
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Scientific German (3)	3	3	
Qualitative Chemistry (4)	3	3	3
Advanced Rhetoric (2)	3	3	
Stock Judging (An. Husb. 4)	3		6
Economic Elective	3	3	
Military Drill			3
Total credits	21		
SECOND SEMESTER.			
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Scientific German (3)	3	3	
Qualitative Chemistry (4)	3	3	3
Advanced Rhetoric (2)	3	3	
Agricultural Physics (Ag. Eng. 1)	3	3	
Practicums (Agri. 8). (½ Sem)	1		4
Economic Elective	3	3	
Military Drill			3
Totals credits	22		
JUNIOR YEAR.			
FIRST SEMESTER.			
Chemistry of Foods (6)	3	3	
Thremmatology (Agri. 4)	3	3	
Principles of Animal Nutrition (1)	3	3	
Plant Diseases (Veg. Path. 1)	3	3	3
Physiology and Ecology (Bot. 3)	3	2	4
Agricultural Elective	3	3	
General Elective	3	3	
Total credits	21		
SECOND SEMESTER.			
Soil Fertility and Soil Management (2)	3	3	
Farm Structures (4)	3	3	
Agricultural Economics (Agri. 6)	3	3	
Physiology and Ecology (Bot. 3)	3	2	4
Live Stock Feeding and Management (7)	3	3	
Farm Engineering (Ag. Eng. 2)	3	3	
Agricultural Elective	3	3	
General Elective	3	3	
Total credits	24		

GENERAL AGRICULTURE

	CREDIT HOURS	LECTURE HOURS	LABORATORY HOURS
SENIOR YEAR.			
Field Crops and Seeds (Agri. 3)	3	3	3
Farm Structures (7)	3	3	
Agricultural Elective	3	3	
Agriculture Elective	3	3	
Agriculture Elective	3	3	
General Elective	3	3	
General Elective	3	3	
Total Credits	21		
SECOND SEMESTER.			
Systematic Pomology (Hort 8) or	3		6
Landscape Gardening (Hort. 6)	3	3	
Farm Management (Agri. 7)	3	3	
Agricultural Elective	3	3	
Agricultural Elective	3	3	
Veterinary Elective	3	3	
General Elective	3	3	
Total credits	18		

JUNIOR AND SENIOR ELECTIVES IN GENERAL AGRICULTURE

Agriculture (Courses 2, 5, 7, 10.)
Chemistry (Course 5)
Animal Husbandry (5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19)
Animal Nutrition (Courses 1, 2, 3, 4, 5)
Botany (Courses 4, 5, 6, 7, 8, 9, 11)
Dairy Husbandry (Courses 1, 3, 5, 6, 7, 8, 11)
Economics (Courses 10, 2, 3, 4, 5, 6, 7, 8, 22, 28)
Entomology (Courses 2, 4, 6, 7)
Farm Structures (Courses 5, 6)
Geology (Courses 3, 4, 5, 6)
German (Course 2)
Horticulture (2, 4, 5, 6, 7, 8)
Pedagogics (Courses 1, 2)
Political Science (Courses 1, 3)
Soils (Course 3)
Vegetable Pathology (Courses 3, 4, 5)
Veterinary (Courses 2, 3, 4, 5)
Zoology (Courses 2, 3, 4, 5)

OUTLINE OF COURSE IN ANIMAL HUSBANDRY

FRESHMAN AND SOPHOMORE YEARS AS IN GENERAL AGRICULTURE

	Credit Hours	Lecture Hours	Laboratory Hours
JUNIOR YEAR.			
FIRST SEMESTER.			
Morphology of Invertebrates (Zoo 2)	3	2	4
Meats (Animal Husb. 10)	3	3	3
Thremmatology (Agri. 4)	3	3	
Factory Butter Making (Dairy H 3)	3	3	
Principles of Animal Nutrition (1)	3	3	
Economic Elective	3	3	
General Elective	3	3	
Total credits	21		
SECOND SEMESTER.			
Morphology of Invertebrates (Zoo. 2)	3	2	4
Animal Breeding (An. Husb 6)	3	3	
Farm Structures (4)	3	3	
Agricultural Economics (Agri. 6)	3	3	
Live Stock Feeding and Management (7)	3	3	
Agricultural Elective	3	3	
General Elective	3	3	
Total credits	21		
SENIOR YEAR.			
FIRST SEMESTER.			
Farm Structures (7)	3	3	
General Physiology (Zoo 5)	3	2	4
Stock Judging (An. Husb. 5)	3		6
Nutrition Research (An. Nutri 2)	3	3	
Dairy Stock Feeding (Dairy H 8)	3	3	
Agricultural Elective	3	3	
General Elective	3	3	
Total credits	21		
SECOND SEMESTER.			
Animal By-Products (An Husb 12)	3	3	
Stock Farm Management (An Husb 8)	3	3	
Animal Mechanics (An Husb 14)	3	3	
Agricultural Elective	3	3	
Veterinary Elective	3	3	
General Elective	3	3	
Total credits	18		

JUNIOR AND SENIOR ELECTIVES IN ANIMAL HUSBANDRY

Agriculture (Courses 3, 5)
Animal Husbandry (Courses 10, 11, 13, 15, 16)
Dairy Husbandry (Course 6)
Veterinary (Courses 2, 3, 4, 5)

OUTLINE OF COURSE IN ANIMAL NUTRITION

FRESHMAN AND SOPHOMORE YEARS AS IN GENERAL AGRICULTURE

	Credit Hours	Lecture Hours	Laboratory Hours
Junior Year.			
First Semester.			
Chemistry of Foods (6)	3	3	
Organic Chemistry (9)	3	3	3
Thremmatology (Agri 5)	3	3	
Principles of Animal Nutrition (1)	3	3	
Physiology and Ecology (Bot 3)	3	2	4
Plant Pathology (1)	3	3	3
Morphology of Invertebrates (Zoo 2)	3	2	4
Total credits	21		
Second Semester.			
Soil Fertility and Soil Management (Soils 2)	3	3	
Organic Chemistry (9)	3	3	3
Morphology of Invertebrates (Zoo 2)	3	2	4
Dairy Bacteriology (7) (½ Sem)	1½	3	
Live Stock Feeding and Management (An. Husb 9)	3	3	
Analysis of Foods (Ag Chem 7)	3	3	3
General Elective (½ Sem)	1½	3	
Physiology of Nutrition (Vet 3) (½ Sem)	1½	3	
Anatomy of Digestion (Vet 2) (½ Sem)	1½	3	
Total credits	21		
Senior Year.			
First Semester.			
Nutrition Research (An Husb 2) (½ Sem)	1½	3	
General Physiology (Zoo 5)	3	2	4
Stock Judging (5)	3		6
Dairy Stock Judging (1)	3		6
Statistics of Nutrition (3)	3	3	
Embryology and Histology (Zoo 3)	3	2	4
Dairy Stock Feeding (8)	3	3	
General Elective (½ Sem)	1½	3	
Total credits	21		
Second Semester.			
General Physiology (Zoo 5)	3	2	4
Nutrition Research (An Husb 11) (½ Sem)	1½	3	
Dairy Bacteriology (5)	3	3	3
Embryology and Histology (Zoo 3)	3	2	4
General Elective (½ Sem)	1½	3	
General Elective	3	3	
General Elective	3	3	
Total credits	18		

OUTLINE OF COURSE IN DAIRY HUSBANDRY

FRESHMAN, SOPHOMORE AND JUNIOR YEARS AS IN ANIMAL HUSBANDRY

	Credit Hours	Lecture Hours	Laboratory Hours
Senior Year.			
First Semester.			
Dairy Stock Judging (1)	3		6
Farm Structures (7)	3	3	
Factory Management (2)	3	3	
General Physiology (Zoo 5)	3	2	4
Cheesemaking (4)	3		6
Principles of Animial Nutrition (1)	3	3	
Nutrition Research (2) (½ Sem)	1½	3	
Dairy Stock Feeding (8)	3	3	
Total credits	22½		
Second Semester.			
Factory Butter Making (3)	3	3	3
Dairy Bacteriology (5)	5	3	3
Dairy Bacteriology (7) (½ Sem)	1½	3	3
Dairy Farm Management (6) (½ Sem)	1½	3	
Physiology of Nutrition (5)	3	3	
Animal Nutrition Research (4) (½ Sem)	1½	3	
Veterinary Elective (2, 3, 4, 5)	3	3	
Total credits	16½		

OUTLINE OF COURSE IN FORESTRY

	Credit Hours	Lecture Hours	Laboratory Hours
Freshman Year.			
First Semester.			
Beginning German or French (1)	3	5	
General Botany (1)	3	2	4
General Rhetoric (1)	3	3	
General Geology (1)	3	3	
General Forestry (1)	3	3	
Mechanical Drawing (Farm Stru 2)	3		6
Elements of Economics (1)	3	3	
Military Drill			3
Total credits	21		
Second Semester.			
Beginning German of French (1)	3	5	
General Rhetoric (1)	3	3	
General Botany (1)	3	2	4
Meteorology (Geol 4)	3	3	
Trigonometry (1)	3	3	
General Chemistry (3)	3	3	3
Plant Propagation (Hort 3)	1	1	2
Military Drill			3
Total credits	22		

	Credit Hours	Lecture Hours	Laboratory Hours
Sophomore Year.			
First Semester.			
Scientific German (3)	3	3	
Advanced Rhetoric (2)	3	3	
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Qualitative Chemistry (4)	3	3	3
Dendrology (2)	3	3	
Physiography (Geol 2)	3	3	
Military Drill			3
Total credits	21		
Second Semester.			
Scientific German (3)	3	3	
Advanced Rhetoric (2)	3	3	
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Qualitative Chemistry (4)	3	3	3
Forest Engineering (1)	3	2	4
Dendrology (2) (First half Sem)	1½	3	
Anmial Diseases (Vet 5) (Last half Sem)	1½	3	
Military Drill			3
Total credits	21		
Junior Year.			
First Semester.			
Forest Entomology (16)	3	2	4
Tree Diseases (Veg Path 1)	3	2	4
Physiology and Ecology (Bot 3)	3	2	4
Wood Technology (Veg Path 2)	3	2	4
Sylviculture (3)	3	3	
Forest Protection (4)	3	3	
Elements of Mineralogy (Geol 6)	3	3	
Total credits	21		
Junior Year.			
Second Semester—First half.			
February 1st to April 15th.			
Forest Entomology (16)	2	2	4
Physiology and Ecology (Bot 3)	3	2	4
Sylviculture (3)	1½	3	
Forest Mechanics (Farm Stru 3)	3	1	8
Photography (20)	1		4
Second Semester—Second half.			
April 15th to September 1st.			
Silviculture (3)	1½		8
Forest Engineering (2)	3		16
Mensuration (5)	3		16
Forest Tree Diseases—Field Work	1		4
Total credits	19		

	Credit Hours	Lecture Hours	Laboratory Hours
Senior Year.			
First Semester.			
Lumbering (7)	3	3	
Management (8)	3	3	
Forest By-Products (9)	3	3	
Forest Economics (10)	3	3	
Advanced Sylviculture (Bot 8)	3	2	4
Wood Preservation (19)	3	2	4
Material Testing Laboratory (18)	2		4
Total credits	20		
Second Semester—First half.			
February 1st to April 15th.			
Lumber Manufacturing (12)	3	3	6
Forest Seminary (15)	3	5	
Advanced Sylvicuture (Bot 8)	3	2	4
Game and Fish (17)	1	2	
General Elective	3	3	
Second Semester—Second half.			
April 15th to June 1st.			
Working plans (14)	3		32
Foreign Forestry (13)	1	4	
Business Law (11)	1	4	
Packing (6)	1		4
Total credits	19		

OUTLINE OF GRADUATE COURSE IN FORESTRY

OPEN TO THOSE HAVING A BACHELOR'S DEGREE

	Credit Hours	Lecture Hours	Laboratory Hours
Junior Year.			
First Semester.			
General Botany (1)	3	2	4
Advanced Botany (2)	3	2	4
Dendrology (2)	3	3	
Sylviculture (3)	3	3	
Forest Entomology (17)	3	2	4
Forest protection (4)	3	3	
General Forestry (1)	3	3	
Mechanical Drawing (Farm Stru 2)	3		6
Total credits	24		
Second Semester—First Half.			
February 1st to April 15th.			
General Botany (1)	3	2	4
Advanced Botany (2)	3	2	4
Dendrology (2)	1½	3	
Sylviculture (3)	1½	3	
Forest Entomology (17)	1½	2	4

	Credit Hours	Lecture Hours	Laboratory Hours
Wood Technology (Veg Path 2)	3	2	4
Forest Engineering (1)	3	2	4
Second Semester—Second half. April 15th to September 1st.			
Sylviculture (3)	1½		8
Forest Engineering (2)	3		16
Forest Mensuration (5)	3		16
Forest Tree Diseases—Field Work	1		4
Total credits	25		
Senior Year. First Semester.			
Lumbering (7)	3	3	
Forest Management (8)	3	3	
Forest Economics (10)	3	3	
Physiology and Ecology (3)	3	2	4
Forest By-Products (9)	3	3	
Tree Diseases (Veg Path 1)	3	2	4
Advanced Sylvicuture (8)	3	2	4
Total credits	21		
Second Semester—First half. February 1st to April 15th.			
Lumber Manufacturing (12)	3	3	6
Forest Seminar (15)	3	5	
Physiology and Ecology (Bot 3)	3	2	4
Advanced Sylviculutre (Bot 8)	3	2	4
Game and Fish (18)	1	2	
Second Semester—Second hailf. April 15th to June 1st.			
Working Plans (14)	3		32
Foreign Forestry (13)	1	4	
Business Law (11)	1	4	
Packing (6)	1		4
Total credits	19		

OUTLINE OF COURSE IN HOME ECONOMICS

DIVISION "A"

Freshman Year. First Semester.			
General Botany (1)	3	2	4
General Geology (1)	3	3	
Beginning German or French (1)	3	5	
General Rhetoric (1)	3	3	
Elements of Economics (1)	3	3	
Physical Geography (Geol 2)	3	3	
Total credits	18		

	Credit Hours	Lecture Hours	Laboratory Hours
Second Semester.			
General Botany (1)	3	2	4
Beginning German or French (1)	3	5	
Industrial Geography (3)	3	3	
General Rhetoric (1)	3	3	
General Chemistry (3)	3	3	3
Economic Elective	3	3	
Total credits	18		

DIVISION "B"

	Credit Hours	Lecture Hours	Laboratory Hours
Freshman Year.			
First Semester.			
Beginning German of French (1)	3	5	
General Botany (1)	3	2	4
Field Agriculture (9)	1	3	
Domestic Chemistry (2)	1	3	
Fruit Growing (Hort 1)	2	3	
Entomology (1) (First half Sem)	½	3	
Elements of Domestic Science (1)	2		4
Elementary Sewing (Dom Art 1)	1½		4
Designs in Drafting (Dom Art 2)	1½		4
General Rhetoric (1)	1	3	
The Family (Dom Eco 1)	1½		
Phyiscal Training			2
Total credits	18		
Second Semester.			
Beginning German or French (1)	3	5	
Agricultural Chemistry (1)	1½	3	3
General Chemistry (3)	1	3	
General Botany (1)	3	2	4
Vegetable Gardening (2) (First half Sem)	½	3	
Plant Propagation (3) (Last half Sem)	½	3	
Elements of Domestic Science (1) (First half)	1		4
Domestic Hygiene (Dom Eco 5) (Last half Sem)	1	3	
Poultry (An Husb 2) (First half Sem)	1	3	
Meats (An Husb 3) (Last half Sem)	½	1	1
Elementary Sewing (Dom Art 1)	1½		4
Designs in Drafting (Dom Art 2)	1½		4
Freehand Drawing (1) (Last half Sem)	1		4
General Rhetoric (1)	1	3	
Total credits	18		
Sophomore Year.			
First Semester.			
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Advanced German of French (2, 3)	3	3	
Qualitative Chemistry (4)	3	3	3
Advanced Rhetoric (2)	3	3	

	CREDIT HOURS	LECTURE HOURS	LABORATORY HOURS
Domestic Science (2)	2		4
The Home (Dom Eco 2)	3	3	
Principles of Teaching (Ped 1)	3	3	
Total credits	23		
SECOND SEMESTER.			
Advanced Botany (2)	3	2	4
General Zoology (1)	3	2	4
Advanced German or French (2, 3)	3	3	
Qualitative Chemistry (4)	3	3	3
Advanced Rhetoric (2)	3	3	
Household Sanitation (Dom Sci 3)	2	2	
Bread Making (Dom Sci 7) (½ Sem)	1		2
General Bacteriology (Dairy h 9)	3	2	4
Total credits	21		
JUNIOR YEAR.			
FIRST SEMESTER.			
Physiology and Ecology (Bot 3)	3	2	4
Position of Woman (Dom Eco 3)	3	3	
Advanced Designing (Dom Art 4)	3		6
Methods in Domestic Science (4)	2	4	
Industrial Education (Ped 2)	3	3	
Quantitative Chemistry (5)	3	1	6
Chemistry of Foods (6)	3	3	
Floriculture (Hort 5)	3	3	
General Elective	3	3	
Total credits	23		
SECOND SEMESTER.			
Physiology and Ecology (Bot 3)	3	2	4
Domestic Art (4)	3		6
Domestic Science Practice Teaching (5)	2		4
Analysis of Foods (Ag Chem 7)	3		6
Farm Structures (6)	3	3	
Designing (Draw 2)	2		4
Textiles (Dom Art 3)	3	3	
General Elective	3	3	
Total credits	22		
SENIOR YEAR.			
FIRST SEMESTER.			
Domestic Service (Dom Eco 4)	3	3	
Household Art (Dom Art 5)	3	3	
Domestic Science Practice Teaching (5)	2		4
Farm Structures (7)	3	3	
Agricultural Elective	3	3	

	Credit Hours	Lecture Hours	Laboratory Hours
General Elective	3	3	
General Elective	3	3	
Total credits	20		
SECOND SEMESTER			
Teachers Course (Dom Sci 6)	3	3	
Handicraft (Dom Art 6)	3	3	
Advanced Domestic Chemistry (8)	3	3	
General Elective	3	3	
General Elective	3	3	
General Elective	3	3	
Total credits	18		

JUNIOR AND SENIOR ELECTIVES IN HOME ECONOMICS

Agriculture (Courses 1, 6, 7, 10)
Agricultural Engineering (Course 1)
Animal Nutrition (Course 1)
Botany (Courses 4, 5, 6, 7, 8, 9, 10)
Dairy Husbandry (Courses 5, 7)
Domestic Art (Course 4)
Domestic Science (Course 6)
Drawing and Designing (Courses 2, 3)
Economics (Courses 1B, 1C, 2, 3, 4, 5, 6, 7, 8, 22, 28)
Education (Courses 1, 2)
Entomology (Courses 2, 4, 5, 7)
Geology (Courses 4, 5, 6)
Horticulture (Courses 6, 7, 8)
Psychology (Courses 1, 2)
Political Science (Courses 1, 3)
Vegetable Pathology (Courses 1, 3, 4)

OUTLINE OF TEACHERS' COURSE IN HOME ECONOMICS

Entrance requirements are the same as for the Home Economics Course.

FIRST YEAR.

FIRST SEMESTER.

Advanced Rhetoric (2)	3	3	
Principles of Teaching (Ped 1)	3	3	
Field Agriculture (9)	1	3	
Agricultural Chemistry (1)	2	3	3
Agricultural Botany (Plant Path 3)	1½	2	4
Entomology (1) (First half)	½	3	
Elements of Domestic Science (1)	2		4
Elementary Sewing (Dom Art 1)	2		4
Designs in Drafting (Dom Art 2)	2		4
The Family (Dom Eco 2)	1½	3	
Domestic Science (2)	2		4

	CREDIT HOURS	LECTURE HOURS	LABORATORY HOURS
Position of Woman (Dom Eco 3)	1½	3	
Physical Training			2
Total credits	22		
SECOND SEMESTER.			
Advanced Rhetoric (2)	3	3	
Domestic Chemistry (2)	3	3	3
Plant Propagation (Hort 3) (Last half)	½	1	2
Vegetable Gardening (Hort 2) (First half)	½	3	
Poultry (An Husb 2) (Last half)	½	3	
Meats (An Husb 3) (½ Sem)	½	1	1
Elements of Domestic Science (1) (½ Sem)	1		4
Elementary Sewing (Dom Art 1)	2		4
Designs in Drafting (Dom Art 2)	2		4
Freehand Drawing (1) (½ Sem)	1		4
General Bacteriology (Dairy H 9)	3		6
Domestic Hygene (Dom Eco 5) (½ Sem)	1	3	
Bread Making (Dom Sci 8) (½ Sem)	1	1	2
Physical Training			2
Total credits	19		
SECOND YEAR.			
FIRST SEMESTER.			
Domestic Science Practice Teaching (5)	2		4
The Home (Dom Eco 2)	1½	3	
Methods in Domestic Science (4)	2		4
Household Art (Dom Art 5)	2		4
Fruit Growing (Hort 1)	2	3	
Chemistry of Foods (6)	3	3	3
Industrial Education (Ped 2)	3	3	
Domestic Art (3)	1½	3	
Domestic Service (Dom Eco 4)	1½	3	
General Elective	1½	3	
Total credits	20		
SECOND SEMESTER.			
Household Sanitation (Dom Sci 3)	2	2	
Methods of Domestic Science (5)	2		4
Textiles (Dom Art 3)	2		4
Domestic Science Practice Teaching (5)	2		4
Methods in Domestic Science (4)	2		4
Domestic Chemistry (8)	3	2	4
Floriculture (Hort 5)	3	3	
Nursing and Dietetics (Dom Sci 6) (½ Sem)	1		3
Drawing and Designing (2)	2		4
General Elective	3	3	
Total credits	22		

Courses of Study

AGRICULTURE

ANDREW BOSS, Professor of Agriculture
C. P. BULL, Assistant Professor of Agriculture
L. P. BASSETT, Instructor in Agriculture
T. P. COOPER, Instructor in Agriculture

1. AGRONOMY — PROFESSOR BOSS AND MR. BASSETT
Three credits (three hours per week) — First semester
Open to freshmen registered in Division B

An elementray course in the study of crop rotation; the production and care of manures; the relation of weeds to crop production and profits; the planting, cultivating, harvesting, storing, seed-selection and marketing of grains, roots, fiber, sugar, hay and other forage crops; meadows and pastures; plant selection and breeding methods.

2. FARM MACHINERY — MR. BASSETT
Two credits (four hours per week) — Second semester
Open to juniors and seniors. Elective

Practical suggestions and practice work are given in connection with the best methods of adjustment, handling and adaptation of the various kinde of machinery to the soils, weeds and seasons. Durability and convenience in manipulation are chief among the points considered.

3. FIELD CROPS AND SEEDS — ASSISTANT PROFESSOR BULL
Three credits (three hours per week) — First semester
Open to seniors.

Students registering for the course must have had at least one year's work in University botany. The course is outlined to occupy two lecture periods and two laboratory periods per week.

(a) SEEDS: THEIR IDENTITY AND VALUE

In this course the students are made acquainted with the physical botany, the uses, identification, vitality, testing, grading and judging of all classes of field seeds. Special attention is given to the reproducing value of seeds of various grades of grains and to the importance of testing. A thesis upon some phase of the subject of seeds is required for full credit.

(b) FIELD CROPS: THEIR STRUCTURE AND USE.

In this course are considered the botany, cultivation and economic value of the various cereal, forage, root, fiber, sugar and miscellaneous crops. Special attention is given to the subjects of meadows, pastures, soilage crops, and to the production and preservation of all kinds of dry cured and ensilaged crops.

4. THREMMATOLOGY — ASSISTANT PROFESSOR BULL
Three credits (three hours per week) — First semester
Open to juniors. Given in alternate years. 1910–1911.

Heredity, variation, law of breeding, the art of breeding, improvement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, immense value of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, fancy points and distinguishing marks, statistical methods in breeding pedigree records of efficiency fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of literature of breeding.

5. PLANT BREEDING — ASSISTANT PROFESSOR BULL
Three credits (three hours per week) — First semester
Open to juniors. Elective. Given in alternate years. (1909–1910)

Botany of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self fertilization, originating varieties and improving standard varieties by selection and by hpbridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation and practical breeding, seed growing as a farm business, seed merchandizing, and the breeding of each of the various field crops grown in Minnesota.

6. AGRICULTURAL ECONOMICS. (Economics 1 B) — MR. COOPER
Three credits (three hours per week) — Second semester
Open to juniors.

Elements of Economics (Course 1) prerequisite. The development of Agriculture; problems of rural life. Agricultural organization and methods. Agricultural finance and a special study of the various economic movements affecting Agriculture.

7. FARM MANAGEMENT — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors.

This course is offered with a view to emphasizing the business side of farming including the systematic arrangement of crops in rotation; the adjustment of crops to location, markets and live stock; the effect of cropping systems on soil productivity and crop yields; the regular employment of capital and the employment and distribution of labor. Special attention is given to drafting and revising farm plans. Each student is required to draft a plan of a farm in which he is interested, where some specialized type of farming is followed, to submit a business statement of the fixed and operating capital employed together with the cost of operation, the revenue and the net profit.

8. AGRICULTURAL PRACTICUMS
One credit (four hours per week) — Last half second semester

Opportunities to gain practical experinece, to acquire greater manual dexterity in doing farm work, to secure practice in conducting experiments and to get experience in teaching agricultural subjects, are offered to college and graduate students when practicable. Students should arrange early in their course for this work, as the opportunities in plant breeding, in rural engineering, in field crops, in agricultural statistics, and in assisting instructors in the various courses are available only at irregular intervals and must be arranged for in advance.

9 **FIELD AGRICULTURE** PROFESSOR A. BOSS AND ASSISTANTS
(Three hours per week) First semester
Open to freshman girls in division B.

A study of the soil origin and types of soil as affecting crop production in Minnesota; soil conditions as affecting moisture and crop growth; planning of fields and farms in consideration of classes of field crops, and the relation of crops to each other and in rotation and the business of farming.

10. **AGRICULTURAL ECONOMICS** (Economics 1 C) MR. COOPER
Three credits (three hours per week) First semester
Open to seniors. Elective.

Agricultural Economics (Course 7) prerequisite. Development of agricultural laws as applied to drainage, water rights, irrigation, land contracts and leases. The fundamental principles underlying contracts; laws governing negotiable papers and their use; courts and their jurisdiction. The development of co-operation and co-operative societies, methods of organization and of operation of agricultural co-operative societies with a special study of their administration.

AGRICULTURAL AND GENERAL CHEMISTRY

HARRY SNYDER, Professor of Agricultural Chemistry
GEO. B. FRANKFORTER, Professor of General and Organic Chemistry
JOHN A. HUMMEL, Assistant Professor of Agricultural Chemistry
EDWARD E. NICHOLSON, Assistant Professor of Chemistry
A. D. WILHOIT, Instructor in Agricultural Chemistry
JOSEPHINE CRAIG, Instructor in Agricultural Chemistry

1 **CHEMISTRY OF PLANT AND ANIMAL LIFE** PROFESSOR ——AND ASSISTANTS
Two credits (five hours per week) Second semester
Open to freshmen registered in division B. Either High School chemistry or B year chemistry, School of Agriculture, a prerequisite.

Some of the topics studied are: the ash elements of plants and their function in plant nutrition, the nitrogenous and non-nitrogenous compounds of plants and animals, the chemistry of seeds and plant growth, the factors influencing the composition and value of crops and the composition and digestibility of foods. The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese are also studied. Laboratory practice forms a prominent feature of the work.

2. **DOMESTIC CHEMISTRY** MISS CRAIG
Two credits (five hours per week) First semester
Open to freshmen in Household Economics course registered in division B. Either High School chemistry or B year chemistry, School of Agriculture, a prerequisite.

A study of human foods and their nutritive value and the chemical and allied changes which take place in the preparation of foods. Some of the subjects considered are: meats, vegetable foods, fruits, cereals, wheat flour, the chemistry of bread-making, baking powders, condiments, tea, coffee, chocolate, the household water supply, dietary studies, the cost of foods, and the rational feeding of man. Laboratory practice is given in testing the commercial value of foods and in the detection of adulterants.

3. GENERAL CHEMISTRY PROFESSOR FRANKFORTER AND MR. WILHOIT
Three credits (three hours per week) Second semester
Open to freshmen.

Recitations, lectures and laboratory practice. Particular attention is given to the study of the elements and compounds which are of the most importance in agriculture. The laws governing the combination of the elements by weight and volume are illustrated by numerous problems. The writing of equations, chemical nomenclature, and the periodic system of classifying the elements are prominent features of the work. In the laboratory experiments are performed illustrating the general laws of chemistry which have a bearing upon agricultural chemistry.

4. QUALITATIVE ANALYSIS ASSISTANT PROFESSOR NICHOLSON AND ASSISTANTS
Three credits (seven hours per week) First and second semesters
Open to sophomores.

This course is arranged to meet the wants of agricultural students. Six hours per week are given to the laboratory work and one period to a lecture and recitation. The writing of equations and the study of principles involved in the separation of the various groups and individual compounds of elements are characteristic features of this work. It is the object of this course to familiarize the student with the processes employed in qualitative analysis, so that he may be able to determine the composition of all ordinary substances, particularly of those that are of the most importance in agriculture.

5. QUANTITATIVE ANALYSIS PROFESSOR FRANKFORTER AND MR. WILHOIT
Four credits (nine hours per week) First semester
Open to juniors and seniors.

An elementary course in quantitative analysis. The principles involved in gravimetric and volumetric analysis are studied. Two periods per week are given to laboratory work and one period to a recitation and lecture. The work includes the gravimetric and volumetric determination of iron, acidimetry and alkalimetry, the gravimetric determination of phosphorus pentoxide, the volumetric determination of calcium oxide, and the determination of nitrogen and potassium oxide. The object of this course is to prepare the student for special work in agricultural chemistry, and is required of all students who elect either course 7 or course 3 in Soils.

6. THE CHEMISTRY OF FOODS PROFESSOR————————
Three credits (three hours per week) First semester
Open to juniors.

Lectures. An advanced course treating of the composition, digestibility, and nutritive value of human and animal foods. The chemistry of plant growth, particularly the factors which influence their composition and nutritive value, forms an essential part of this course. The processes employed in the preparation of foods, as the milling of wheat and other cereals, the economic uses of human and animal foods, the comparative value of foods, and the chemical methods employed in human nutrition investigations, particularly in proteid and carbohydrate metabolism, and the losses of energy from the body, are studied. Dietray studies, including the cost of nutrients, and influence of different methods of preparation upon their nutritive value, are also included in the work. It is the object of this course to familiarize the student with the fundamental principles of nutritition and the use of literature upon the subject.

7. ANALYSIS OF FOODS. PROFESSOR———————— AND ASSISTANTS
Three credits (seven hours per week) First and second semesters
Open to juniors and seniors. Elective.

(a) This work includes the determination of water, ash, starch, sugar, cellulose, pentosans, fats, proteids, and the different forms of nitrogen in food stuffs, the use of the calorimeter, and the ploariscope in food analysis. Before completing the work, each student makes a complete proximate analysis of some food material. This course is planned to meet the wants of those who desire to become familiar with the methods employed in the analysis of foods and in nutrition investigations. One hour per week is devoted to a lecture and recitation.

(b) A second semester's work can be taken in the analysis of dairy and animal products, as fodders, milk, butter, cheese, and animal feces. Special features of the course are the determinations of volatile fatty acids, iodin absorption, specific gravity and the sponification equivalent of fats. The object of this course is to meet the wants of those who desire to become familiar with the methods of investigations employed in research in dairy chemistry.

8. **ADVANCED DOMESTIC CHEMISTRY AND DIETETICS** — MISS CRAIG

Three credits. — Second semester

Open to seniors.

Lectures and recitations. Advanced course. Courses 6 and 7a required as preliminary preparation.

9. **ORGANIC CHEMISTRY** — PROFESSOR FRANKFORTER

Three credits (six hours per week) — First and second semesters

Open to juniors.

Lectures and laboratory work. The course includes the aliphatic series with a preparation of the more important compounds, supplemented by Levy's Anleitung fur Darstellung Organischer Preparate. Also the aromatic series with a preparation of some of the more important compounds supplemented by Fischer's Organischer Preparate.

AGRICULTURAL ENGINEERING AND PHYSICS

JOHN T. STEWART, Professor of Agricultural Engineering and Physics
H. B. ROE, Assistant in Engineering

1. **AGRICULTURAL PHYSICS** — PROFESSOR STEWART

Three credits (six hours per week) — Second semester

Open to sophomores.

This work is carried on by lectures, class demonstrations, reference work, discussions and note book records. Among the subjects treated are: method of keeping original records, molecular nature of matter, the laws of specific gravity, heat, evaporation, water pressure, explosives and their use on the farm, the physical properties and manufacture of cement, drain tile and sewer pipe. Temperature, rainfall, runoff and their effect on agricultural production. Soils as related to roads and drainage.

2. **FARM ENGINEERING** — PROFESSOR STEWART

Three credits (six hours per week) — Second semester

Open to juniors and seniors who have had Agricultural Physics. Methods of making U. S. land surveys, and the principles of resurveying, the improvement of farm lands by open ditches, under drainage, levees, outflow culverts, and pumps. A brief summary of irrigation methods in the arid, semi-arid and humid regions; roads and road construction in agricultural districts. Methods and cost of farm fencing, practical work in mensuration, and elementary surveying.

FOREST ENGINEERING — PROFESSOR STEWART

Three credits (six hours per week) — Second semester

Open to sophomores who have had trigonometry, and have a knowledge of the principles of mechanical drawing and lettering. Should have had not less than one semester in mechanical drawing.

Method of making the original land surveys, and the principles of retracing lines and relocating corners, method of representing and arranging field data on plats, a study of topographec symbols and the elements of topographic drawing, including tracing, and blue printing, lectures and demonstration on man, horse and canoe packing, camp equipment and camp discipline.

2. FOREST ENGINEERING — PROFESSOR STEWART
Three credits (one hundred eighty hours) — (In Itasca Park)
Open to those who have completed the above course in forest engineering

Field practice in mensuration, surveying, pacing, and rapid methods of field topography, use of transit, level, and plane table, preparing report of field work which will include finished plats, and maps of survey notes.

NOTE:—Students taking any of the above courses must provide themselves with the necessary drafting instruments, regulation note books, drawing paper, etc.

At the beginning of the courses in agricultural and forestry engineering there will be some duplication of lecture work. A student taking both courses will be given extra work in lieu of that which is duplicated in the other course.

ANIMAL HUSBANDRY

ANDREW BOSS, Professor of Animal Husbandry
D. A. GAUMNITZ, Assistant Professor of Animal Husbandry
W. F. HANDSCHIN, Instructor in Animal Husbandry
J. L. EDMUNDS, Instructor in Animal Husbandry
J. M. DREW, Instructor in Poultry

1. STUDY OF BREEDS AND TYPES — MR. EDMONDS
Two credits (three hours per week) — First semester
Open to freshmen registered in division B.

The market classes of horses, cattle, sheep and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with most common and valuable breeds for the state. These are studied carefully as regards their origin and characteristics, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at the University Farm for this purpose. Work in stock judging is combined with studies of the breeds and types.

2. POULTRY — MR. DREW
One credit (three hours per week) — First half second semester
Open to freshmen registered in division B.

The instruction in this subject will include the following topics: history and characteristics of the leading breeds of poultry; breeding, rearing and management of fowls for eggs and for the market; planting, building and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

3. MEATS — ASSISTANT PROFESSOR GAUMNITZ
One-half credit (one hour per week) — Second half second semester
Open to freshmen girls registered in division B.

The instruction given to the students in home economics in the subject of meats pertains to the selection and value of different classes of meats and to the best methods of curing and preserving.

4. STOCK JUDGING — ASSISTANT PROFESSOR GAUMNITZ
Three credits (six hours per week) — First semester
Open to sophomores

This course is calculated to meet the needs of students desiring to become expert stock judges and of those who wish to study animal form with a view of becoming breeders of superior animals.

Score card work in combination with the presence of living specimens is a feature of this course. Students are drilled in judging from the standpoint of breed, type, form, stamina, quality, breeding capacity, suitability for feeding and for general and specific production.

5. STOCK JUDGING — PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ
Three credits (six hours per week) — First semester
Open to seniors.

An advanced course consisting of practice in judging market classes of fat stock and special work with breeding stock. Trips of inspection to neighboring stock farms will be made and work given in county fair judging where suitable arrangements can be made.

6. ANIMAL BREEDING — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors.

A study of the physiology of the reproductive organs of animals and of the processes of reproduction; the causes and forms of variation; the laws of transmission and heredity; the application of these principles to the practical methods of breeding; a review of the practices of breeders famous for the improvement of live stock; outlines of methods for individual breeding operations, and for co-operative operations including plans for a community co-operative breeding project.

7. LIVE STOCK FEEDING AND MANAGEMENT — ASSISTANT PROFESSOR GAUMNITZ
Three credits (three hours per week) — Second semester
Open to juniors.

The principles of feeding as applied to economical production; feeding rations, feed stuffs, methods of feeding, care and management of breeding and fattening stock, management of animals during pasture, yard and stall feeding for the block, and stable management suitable for the various classes of live stock. The work is based on the investigations of the experiment stations, and a careful review of station bulletins and publications will be made.

8. STOCK FARM MANAGEMENT — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors.

In this course special attention is given to the crops and rotations that fit in with live stock farming, economy of feeds and pasture production; to be taken with course 6, Agriculture.

9. NUTRITION RESEARCH — PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ
One and one-half credits (three hours per week) — First half second semester
For outline of work see course (4) Animal Nutrition.

10. **MEATS** ASSISTANT PROFESSOR GAUMNITZ
Three credits (three hours per week) First semester
Open to juniors.

A continuation of studies in meats as outlined in the school course. Supplemented by dissection and studies of muscular structure of various kinds of meat.

This course is designed especially for studying meat making animals and their products. Under general guidance each student makes up rings of animals which he studies in detail, at every step from the live state until the different parts are cooked and tested at the table. Full records and conclusions, as well as illustrations are required in thesis form.

11. **LIVE STOCK RECORDS AND RESEARCH** PROFESSOR BOSS
Three credits (six hours per week) Second semester
Open to seniors. Elective.

This course will consist of reviewing literature upon different phases of stock production. The Experiment Station records and other sources of information will be used largely. This together with original work will form the basis of extended compilation of material on live stock husbandry, and a thorough study of systems of keeping and compiling stock records upon stock farms and at expermient stations. Sufficient actual practice will be required to become familiar with live stock records and herd books.

12. **ANIMAL BY-PRODUCTS** ASSISTANT PROFESSOR GAUMNITZ AND MR. PATERSON
Three credits (three hours per week) Second semester
Open to seniors.

Individual study of the by-products manufactured at the large packing houses will be required of each student. The value and place that each has in economc uses is considered.

13. **ADVANCED MEATS AND JUDGING** ASSISTANT PROFESSOR GAUMNITZ
Three credits (six hours per week) Second semester
Open to juniors and seniors. Elective.

Work along this line is a continuation of that begun in course 12. More attention is given the more important details concerning meat, and a minute study of its physical and chemical composition is required.

14. **ANIMAL MECHANICS** PROFESSOR REYNOLDS AND ASSISTANT PROFESSOR GAUMNITZ
Three credits (three hours per week)
Open to seniors.

A study of the mechanical effects of different relationships of bone and muscle in the animal body. This applies particularly to horses. The entire feet and legs as well as the body will be studied and made clear by apparatus and original illustrations.

15. **LIVE STOCK PRACTICUMS** MR. EDMUNDS
Two credits (four hours per week) Second semester

Feeding and stable management of cattle, horses, sheep and swine; recording and caluclating amounts of pasturage obtained from different forage crops, keeping herd records, writing pedigrees and recording animals, calculating feeding records and cost of production, mechanical analysis of carcasses of animals to determine total amount of meat and proportionate amounts of fat and lean, determinations of fat and lean meat with specially designed apparatus; calculating percentage of different parts of the carcass.

16. **Anatomy of Digestion** (Vet 1) **Professor Reynolds and Dr. Pyle**
One and one-half credits (three hours per week) First half second semester
Open to juniors and seniors. Elective.
Given in alternate years. 1909–1910.

Comparative anatomy of the digestive organs, dissection, collateral reading and recitation. Chauveau's Comparative Anatomy is used for reference and comparison.

17. **Physiology of Nutrition** (Vet 3) **Assistant Professor Lipp**
One and one-half credits (three hours per week) Last half second semester
Open to juniors and seniors. · Elective. Given in alternate years 1909–1910.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditure, sources of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

18. **Anatomy of Locomotion and Conformation** (Vet. 4) **Veterinary Dr. Pyle**
One and one-half credits (three hours per week) First half second semester
Open to juniors and seniors. Elective. Given in alternate years 1910–1911.
This course deals with the anatomy of locomotion and conformation.

The bones, articulations and muscles involved in locomotion and conformation are studied by text-book, dissection and collateral reading. Shoeing, diagnosis and treatment of common forms of lameness may be included in course 3. Strangeway's Veterinary Anatomy is used as a text-book and Chauveau's for reference.

19. **Common Diseases** (Vet. 5) **Professor Reynolds**
One and one-half credits (three hours per week) Last half second semester
Open to juniors and seniors.

This course covers causes, prevention, and deals with common and serious diseases of domestic animals.

ANIMAL NUTRITION

T. L. Haecker, Professor of Animal Nutrition
Andrew Boss, Professor of Animal Husbandry
Dr. Reynolds, Professor of Veterinary Medicine and Surgery
D. A. Gaumnitz, Assistant Professor of Animal Husbandry
Dr. Lipp, Assistant Professor of Veterinary Medicine and Surgery

1. **Principles of Animal Nutrition** **Professor Haecker**
Three credits (three hours per week) First semester
Open to juniors.

Lectures and class room work. The principles of animal nutrition, their relation to the economic production of animal and animal products, and the relation of the constituents in nutriment consumed to amount and character of products produced from the basis of this course. Accompanying this course there will be assignments carrying out some phase of animal production or the production of some animal product, tracing the disposition made of the nutrients in the feed. Practice work is given in formulating and compounding rations, in the study of comparative value of food stuffs and other problems relating to feeding.

2. NUTRITION RESEARCH PROFESSOR HAECKER

One and one-half credits (three hours per week) First semester

Open to seniors.

Seminar and laboratory work in the study of animal nutrition problems. This course is open to advanced students and is offered during the last half of the first semester. The student is required to become familiar with the literature of some phase of animal nutrition, outline and conduct an investigation under the supere vision of the instructors of the department, and prepare a suitable report of the investigation. For carryiang out this work animals will be provided for feeding operations and laboratory facilities afforded for analytical work. The object of this course is to familiarize the student with the methods employed in the study of animal nutrition problems.

3. STATISTICS OF NUTRITION PROFESSOR HAECKER AND ASSISTENTS

Three hours. Second semester

Open to juniors and seniors. Elective.

This includes a thorough study of experiments made on income and expenditure of matter and the income and expenditure of energy, the relation of food consumed to kinds and character of energy expended.

4. NUTRITION RESEARCH (Animal Husbandry 11) PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ

One and one-half credits (three hours per week) First half second semester

Open to seniors.

This course is open to advanced students and is offered during the first half of the second semester. The student is required to become familiar with the literature of some phase of animal production, outline and conduct an investigation under the supervision of the instructors of the department, and prepare a suitable report of the investigation. For carrying out this sort of work animals will be provided for slaughter tests. The object of this course is to familiarize the student with the methods employed in the study of problems relating to animal production.

5. PHYSIOLOGY OF NUTRITION 1909–1910. ASSISTANT PROFESSOR LIPP

One and one-half credits (three hours per week) Last half second semester

Open to juniors and seniors.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

6. DAIRY STOCK FEEDING (Dairy Husbandry 8) PROFESSOR HAECKER

Three credits (three hours per week) First semester

Open to juniors and seniors.

Lectures on the characteristics, composition and nutrition value of feed stuffs; the economical production of dairy stock and dairy products. A study of the production value of feeds or the relation of feeds to product. Practice work in formulating rations.

BOTANY

FREDERICK E. CLEMENTS, Professor of Botany
JOSEPHINE E. TILDEN, Assistant Professor of Botany
CARL O. ROSENDAHL, Assistant Professor of Botany
W. L. HUFF, Instructor in Botany
FREDERICK K. BUTTERS, Instructor in Botany

1. GENERAL BOTANY PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL, MESSRS. HUFF AND BUTTERS

Six credits (six hours per week) First and second semesters

Open to freshmen.

Greenhouse study of the behavior and structure of flowering plants, following the life cycle from germination to seed production; laboratory study of the evolution of the plant kingdom and the underlying principles of plant life; laboratory and greenhouse work in the indentification and relationship of flowering plants, together with field work on the plants of forest and grassland; practical papers on selected topics, viz., bacteria, plant growth, evolution, etc.

2. ADVANCED BOTANY PROFESSORS CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL

Six credits (six hours per week) First and second semesters

Open to sophomores.

Systematic work in the naming and classification of plants, chiefly of the groups of economic importance, i. e., flowering plants, fungi and algae, with emphasis on the common plants of Minnesota; ecological study in the greenhouse of the structure and meaning of the adaptations of root, stem and leaf, and in the field of the principles of plant distribution, migration and grouping; cytological study of growth, production of pollen and egg-cells, fertilization, hybridizarion, and seed formation; one practical paper each semester, cytology of plant breeding and the botany of a group of economic plants for horticultural students; plant adaptations and the life history of a forest for forestry students.

3. PHYSIOLOGY AND ECOLOGY PROFESSOR CLEMENTS AND MR. HUFF

Six credits (six hours per week) First and second semesters

Open to juniors.

Study of the factors which make the plant's home, viz., water, light, heat, soil, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization, and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc., of plants; one practical paper each semester on selected topics, e. g., acclimatization, adaptation, origin of new forms, vegetation of Minnesota, of North America, etc.

4. ALGAE ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A detailed comparative study of the structure and classification of the algae; the blue-green and the yellow-green algae together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. FUNGI — PROFESSOR CLEMENTS

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. MOSSES AND FERNS — ASSISTANT PROFESSOR ROSENDAHL AND MR. HUFF

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses and ferns. Lectures, laboratory and field work.

7. FLOWERING PLANTS — ASSISTANT PROFESSOR ROSENDAHL

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. ECOLOGY — PROFESSOR CLEMENTS

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. PLANT PHYSIOLOGY — PROFESSOR CLEMENTS

Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work.

11. INDUSTRIAL BOTANY — ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) — Both semesters

Open to technical students who have completed course 1 and to academic students who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A study of the origin, distribution and cultivation of plants, yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

DAIRY HUSBANDRY

T. L. HAECKER, Professor of Dairy Husbandry
EDW. K. SLATER, Assistant Professor of Dairy Husbandry
G. P. GROUT, Instructor in Dairy Husbandry and Bacteriology

1. **DAIRY STOCK JUDGING** — MR. GROUT
Three credits (three hours per week) — First semester
Open to juniors and seniors.

The gross anatomy of the dairy cow is studied, showing the relation of form to function. Complete life record of many cows is at the students' disposal, giving not only the total yield of each cow, but their economic production as well, placing the work on a scientific basis. A brief history of the dairy breeds is given and practical drill in breed characteristics. Many pure bred herds in the vicinity of the Twin Cities are visited after laying a foundation by working on cows whose economic habits are known. The last six weeks of the semester are devoted to a systematic study of pedigrees.

2. **FACTORY MANAGEMENT** — ASSISTANT PROFESSOR SLATER
Three credits. — First semester
Open to juniors and seniors.

Includes a study of the organization of creamery associations essential for success in operating creameries, the construction and equipment of whole milk and hand separator factories, and lectures on calculating dividends, sinking funds, percentage of yield, over-run, etc.

3. **FACTORY BUTTERMAKING** — ASSISTANT PROFESSOR SLATER
Three credits (six hours per week) — First semester
Open to juniors and seniors.

Includes lectures on the composition of dairy products, separation of milk cream ripening, preparation of pure culture starter, pasteurization, churning and working, controlling moisture content of butter, preparing the butter for market a study of market requirements, the examination and scoring of butter and cheese, and practical demonstrations in the college creamery.

4. **CHEESEMAKING** — ————————
Three credits (Given during factory course Nov. 16—Dec 18) First semester
Open to juniors and seniors.

Includes lectures and practical work in making common and fancy cheese, as Brick, Swiss, Sage, Stilton, Pineapple and Gouda; also advanced work in the study of the importance of the quality and composition of the milk in manufacturing Cheddar cheese; the principles involved in cutting, heating, milling, salting and pressing the curd, curing and marketing cheese, and the construction and ventilation of factories and curing rooms.

5. **DAIRY BACTERIOLOGY** — MR. GROUT
Three credits (six hours per week) — Second semester
Open to juniors and seniors.
Required in the Dairy and elective in the other courses.

Instruction is given in the preparation of culture media and the cultivation bacteria. During the semester a general study is made of bacteria, their function nd activities, together with a study of the milk flora and of commercial cultures.

6. **Dairy Farm Management** — Professor Haecker and Mr. Grout
One and one-half credits (three hours per week) — Last half second semester
Open to juniors and seniors.

Lectures covering the fundamental principles of breeding for developing the highest efficiency in the mature animal. Forage crops will be considered and the arrangements of pasture and field for the most economical feeding of stock. One dairy barn plan will be required.

7. **Dairy Bacteriology** — Mr. Grout
One and one-half credits (three hours per week) — First half second semester
Open to juniors and seniors.

Lectures on the morphology, classification, physiology and cultivation of bacteria; their relation to sanitary milk production and to scientific dairying.

8. **Dairy Stock Feeding** — Professor Haecker
Three credits (three hours per week) — First semester
Open to juniors and seniors.

Lectures on the characteristics, composition and nutritive value of feed stuffs; economical production of dairy stock and dairy products. A study of the production value of feeds, or the relation of feed products. Practice work in formulating rations.

9. **General Bacteriology** — Mr. Grout
Three credits (six hours per week) — First semester
Open to freshmen. Elective.

Text, lecture and laboratory work covering the subject in a general way. Intended to train the student in laboratory methods for investigation along special lines offered later in the college course. Text Muir and Ritchie.

10. **Dairy Husbandry** — Professor Haecker and Assistants
Two credits (six hours per week) — Second semester
Open to freshmen registered in Division B.

Lectures giving instruction in the care of milk, the running of farm separators, and the manufacture of butter. Lectures on the characteristics of the different dairy breeds and points desirable in animals intended for the dairy; the relation of form to production being the basis of instruction in dairy stock selection. Lectures are also given covering the practical phases of feeding. Along with these lectures, practice work is given in cream ripening, churning, working and packing butter, in the use of cream separators, and in milk testing.

DOMESTIC ART

Margaret J. Blair,
Edith Staples, Assistant
Avis C. Hall, Assistant

1. **Elementary Sewing** — Mrs. Blair
Four credits (four hours per week) — Both semesters
Open to freshmen registered in Division B.

Instruction is given in hand-sewing, including the different stitches, hems, seams, gussetts, plackets, fastenings and the various kinds of darning and patching, taking up the practical application of each. Talks are given on the use and care of the work basket, touching upon the history of its implements, and upon the textiles cotton, wool, silk and linen.

2. **DESIGNING AND DRAFTING** — MRS. BLAIR
Four credits (four hours per week) — Both semesters
Open to freshmen and sophomores.

Each student is given instruction in designing, drafting, cutting and making of children's garments, also underwear for adults. The drafting is taught by a simple method in which only a tape line and square are used. Lecture work deals with the selection of suitable material and the care of the underwear.

3. **TEXTILES** — MRS. BLAIR
Three credits (three hours per week) — Second semester
Open to juniors.

A course in textiles is given the second semester. This includes the study of cotton, linen, flax and wool, the manufacture of the different materials. The student is required to make a note-book containing sample of each material as it is studied.

4. **ADVANCED DESIGNING, DRAFTING, ETC.** — MRS. BLAIR
Six credits (six hours per week) — Both semesters
Open to seniors.

Instruction is given in designing, drafting, fitting and finishing a gown; also a color study from nature in reference to harmony of color in dress. Lectures are given upon proper dress, its style, neatness and suitability to the wearer. Practice teaching.

5. **HOUSEHOLD ART** — MRS. BLAIR
Three credits (three hours per week) — First semester
Open to juniors.

Household art lectures are given upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; also the influence of the outlook; an elementary study of architecture in connection with planning a house; instruction in the fundamental value of color, form and design; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishing and furnishings of the house.

6. **HANDICRAFT** — MRS. BLAIR
Three credits (six hours per week) — Second semester
Open to seniors.

Pottery, basketry, leather work, weaving, crocheting and knitting are taken up in this course and studied in their simpler forms.

DOMESTIC ECONOMICS

FANNIE C. BOUTELLE
MARTHA B. MOORHEAD, M.D., Lecturer in Domestic Hygiene

1. **THE FAMILY** — MRS. BOUTELLE
Three credit hours. — First semester
Open to freshmen.

History of the family as an institution. The economic function of the family with regard to industry, prosperty, education and population. The psychology of family life. Lectures, problems and recitations.

2. **THE HOME** — MRS. BOUTELLE
Three credit hours — First semester
Open to sophomores.

The evolution of the modern home from primitive conditions Evolution of the social, industrial, religious and economic conditions in the home, and their relation to civic life. Influence of the standard of living. Administration, organization and maintenance of the home. Lectures, problems and recitations.

3. **LEGAL AND ECONOMIC POSITION OF WOMAN** — MRS. BOUTELLE
Three credit hours. — First semester
Open to juniors.

Women as wage earners and the effect from an economic standpoint. Co-operation, with special reference to womans work. Investments. Lectures, problems and recitations.

4. **DOMESTIC SERVICE** — MRS. BOUTELLE
Three credits hours — First semester
Open to seniors.

History of domestic service in America. Economic phases of domestic service. Disadvantages of domestic service, from both the standpoint of employer and employee. Doubtful remedies for present conditions. General principles of possible remedies. Lectures, problems and recitations.

5. **DOMESTIC HYGIENE** — DR. MOORHEAD
One credit. — First half second semester
Open to freshmen registered in division B.

Several lectures will be given upon maidenhood, maternity and infancy. These special lectures will be supplemented by the regular lectures which consider the health of the family as dependent upon pure food, pure water, personal cleanliness and proper habits as well as upon heredity. The aim is to impress the truth that a knowledge and observance of the laws of hygiene are essential to the preservation as well as the restoration of health.

DOMESTIC SCIENCE

JUNIATA L. SHEPPERD
MARY L. BULL, Assistant
MAY MACDONALD, Assistant

1. **ELEMENTARY DOMESTIC SCIENCE** — MISS SHEPPERD
Three credits (four hours per week) — First and first half second semester
Open to freshmen registered in division B.

Fuels.—Composition, source and available power for household use are considered together with various appliances used in the culinary art.

Cooking.—The composition, digestibility, food and money value of vegetables, cereals, breads, are carefully studied, and possible losses in preparing and cooking are elaborated by the use of suitable laboratory exercises. The cooking of vegetables, cereals, breads, etc., are special topics considered. Research work is directed largely toward acquiring reliable data regarding the composition, digestibility, comparative food and money values of such materials as are used in the bi-weekly laboratory practice.

Laundering.—During the first half of the second semester the principles of laundering are taken up; removing stains, dyeing, bleaching, etc., as well as the right use of chemicals and machinery in the laundry receive due attention. The comparative value of starches and bluings is studied. The use of hand and commercial laundry machinery is taught by means of demonstration, observation and reading. Textbooks, lectures, assigned readings and recitations.

2. **Domestic Science** — **Miss Shepperd**
Two credits (four hours per week) — First semester
Open to sophomores.

During the year special attention is given to fruit dishes, the preservation of fruit by means of canning, preserving, pickling, jelly making, etc., followed by such other work as conditions and prices of materials warrant.

3. **Domestic Science—Household Sanitation** — **Miss Shepperd**
Two credits (two hours per week) — Second semester
Open to sophomores.

Instruction consists of discussions in regard to the conditions necessary to healthfulness; the general application of sanitary principles in relation to food, air and water; care of plumbing, heating, lighting and ventilating apparatus; disposal of kitchen waste, etc.

4. **Methods in Domestic Science** — **Miss Shepperd**
Four credits (four hours per week) — Both semesters
Open to juniors.

The object of this course is to acquaint the students with approved methods of conducting laboratory work that they may acquire ability to teach successfully under varied conditions; to give such efficiency as will insure pupils working rapidly, harmoniously and successfully from the first. General information concerning their class work in practice teaching is required in the form of an itemized account; i. e., kind and amount of materials used, number of students present, cost of lessons, etc., followed by syllabi of certain topics, as water, air, etc., and laboratory practice.

5. **Domestic Science Practice Teaching** — **Miss Shepperd**
Four credits (four hours per week) — Both semesters
Open to seniors.

The dining room in its different phases of equipment, care, etc.; labor saving devices and the possible application of business methods in housekeeping receive due consideration. Independent teaching with as much practice as possible in selecting food materials at the market, preparing and serving with limited means, is required. Class-room discussions, laboratory practice, etc.

This is the culmination of the student's school work and each is expected to show her ability to use knowledge by preparing floor plans showing equipment, with details for construction and tentative cost of a laboratory kitchen as well as to make lesson outlines, practice their use and revise and perfect them as far as possible.

6. **Domestic Science—Nursery and Dietetics** — **Dr. Richard Baird**
Second semester
Open to juniors and seniors. Elective.

The University Training School for Nurses is, primarily, a school for nurses; but arrangements have been made whereby seniors in Domestic Science will be permitted to take advantage of the lectures, which will cover elementary nursing, dietetics, emergency work, etc. Due credit will be allowed for all work taken.

7. **Bread Making** — **Miss Shepperd**
One credit (two hours per week) — Second half second semester
Open to sophomores.
Yeast breads. Lectures, library research, practice and classroom discussions

DRAWING AND DESIGNING

FREEHAND

MISS CLOPATH, Instructor in Freehand Drawing and Designing

1. FREEHAND DRAWING — MISS CLOPATH
One credit (four hours per week) — One-half second semester
Study of proportion and form, including drawing from plants and from objects. The study of perspective in rectangular and cylindrical objects. Out-of-door architecture and interior drawing.

2. DESIGNING — MISS CLOPATH
Four credits (four hours per week) Elective — Both semesters
History of the principles of designing with exercises, using alphabet, animal and plant motives. Adaptation of these designs to articles of household use. The theory of color with exercises in hue, value and intensity in relation to color harmony. Exercises in lettering.

3. ADVANCED DESIGNING — MISS CLOPATH
Four credits (four hours per week) — Both semesters
Course 2 prerequisite. Elective.
Advanced work along same lines as Course 2.

ECONOMICS

PROFESSOR GRAY
PROFESSOR GREEN, PROFESSOR ROBINSON
PROFESSOR PHELAN, MR. COULTER AND MR. COOPER

1. ELEMENTS OF ECONOMICS — PROFESSOR ROBINSON, DR. PHELAN AND MR. COULTER
Three credits (three hours per week) — Repeated each semester
Open to sophomores, juniors and seniors; designed for those who desire a general knowledge of economics and as an introduction to the more advanced courses offered in the department.

1a. FOREST ECONOMICS AND FOREST LAW — PROFESSOR GREEN
Three credits (three hours per week) — First semester
Open to juniors. Course 1 prerequisite.
The development of forestry in the United States and foreign countries, the forest conditions here and abroad and their effect upon the lumber industry; forest policies of different governments. Lectures, collateral reading and reports.

1b AGRICULTURAL ECONOMICS — MR. COOPER
Three credits (three hours per week) — Second semester
Open to juniors. Course 1 prerequisite.
The development of Agriculture; problems of rural life. Agricultural organization and methods. Agricultural finance and a special study of the various economic movements affecting Agriculture.

1c. ARGICULTURAL ECONOMICS — MR. COOPER
Three credits (three hours per week) — First semester
Open to seniors. Course 1b prerequisite.

Development of agricultural laws as applied to drainage, water rights, irrigation, land contracts and leases. The fundamental features underlying contracts; laws governing negotiable papers and their uses; courts and their jurisdiction. The development of co-operation and co-operative societies, methods of organization and of operation of agricultural co-operative societies with a special study of their administration.

2. ECONOMIC GEOGRAPHY — PROFESSOR ROBINSON
Three credits (three hours per week) — First semester
Open to sophomores, juniors and seniors.

A study of the economic basis of modern civilization. The course embraces (1) a brief survey of the history of commerce prior to the modern period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and (5) a more detailed consideration of the natural resources, chief industries, commercial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text-book, supplemented by lectures, reports on special topics, and quiz.

3. MODERN INDUSTRIAL AND COMMERCIAL HISTORY — PROFESSOR GRAY
Three credits (three hours per week) — Both semesters
Open to sophomores, juniors and seniors; may be taken in conjunction with course 1 or course 2; both semesters must be completed before credit is given for the first semester.

The industrial and commercial history of western Europe and America since the middle of the eighteenth century. The effects of modern inventions and political changes on industry and trade. Lectures with prescribed topical readings. One written report of considerable length will be required each semester.

4. ADVANCED ECONOMICS — PROFESSOR GRAY
Three credits (three hours per week) — Second semester
Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largelv to a study of recent theories of distribution. Assigned readings, reports and discussions.

5. MONEY AND BANKING — DR. PHELAN
Three credits (three hours per week) — Repeated each semester
Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings and discussions.

6. PUBLIC FINANCE — PROFESSOR ROBINSON
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the viewpoint of public wants. Budget system of the leading countries, with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION — PROFESSOR ROBINSON
Three credits (three hours per week) — Second semester
Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, Essays in Taxation, and reports of state tax commissions with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION PROFESSOR ROBINSON
Three credits (three hours per week) Second semester
Open to those who have completed course 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication, with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcels post and express service; economic functions and relations of highways.

22. MATERIALS OF COMMERCE MR. COULTER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 2.

A study of the principal wares of commerce with reference to sources, uses and industrial processes. Text-books with collateral reading, lectures and visits of inspection.

28. FINANCIAL HISTORY OF THE UNITED STATES DR. PHELAN
Three credits (three hours per week) Second semester
Open to those who have completed courses 1 and 5.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, and discussions.

EDUCATION

Course 1 in philosophy and courses 1 and 2 in education are specified as necessary for the University Teacher's Certificate. One other three-hour course for a half year is required for this certificate, and is elective from the courses in education.

1. HISTORY OF EDUCATION TO THE REFORMATION ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) First semester
Open to juniors and seniors.

An introductory study in the history of education conducted by means of lectures, assigned readings, discussions and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in Medieval times, the rise of the University and of the humanistic schools of the Renaissance.

2. HISTORY OF MODERN EDUCATION ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) Second semester
Open to juniors and seniors who have taken course 1 in education.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

ENTOMOLOGY

FREDERICK L. WASHBURN, Professor of Entomology
A. G. RUGGLES, Instructor in Entomology
HENRY J. FRANKLIN, Instructor in Entomolgy

1. GENERAL ENTOMOLOGY — PROFESSOR WASHBURN
Three hours per week. — First half first semester
Required of freshmen registered in division B.
The structure and classification of insects. Study of the orders.

2. ECONOMIC ENTOMOLOGY — PROFESSOR WASHBURN, MR. RUGGLES, DR. FRANKLIN
Three credits (three hours per week) — First semester
Open to juniors and seniors. Elective.
Lectures upon injurious insects of Minnesota and best methods of combating the same. The use of insecticides and spraying machinery. Beneficial insects.

3. FOREST ENTOMOLOGY — DR. FRANKLIN AND MR. RUGGLES
Five credits (six hours per week) — Both semesters
Open to juniors in forestry.
This course aims to give the student a thorough, practical training in elementary entomology. They will be directed in a special study of insect affecting forest and shade trees, and will be encouraged in doing field work, collecting, identifying, and becoming familiar with the life history of forest insects.

4. COMPARATIVE ANATOMY AND HISTOLOGY OF INSECTS — MR. RUGGLES
Three credits (six hours per week)
Open to juniors and seniors. Elective.
A detailed study of structure of representatives of different orders of insects.

5. ELEMENTS OF BEE KEEPING — PROFESSOR WASHBURN
One credit (two hours per week) — Second half second semester
Open to juniors and seniors.
One lecture a week and work in apiary during spring term.
Offered to those qualified for the work.

6. SPECIAL PROBLEMS — PROFESSOR WASHBURN
Three credits (three hours per week) — First or second semester
Open to graduate students only. Elective.

7. INSECTS AND DISEASES — PROFESSOR WASHBURN
One credit — Second half second semester
Open to juniors and seniors.
Lectures upon insects and insect-like animals which are in any way carriers of disease, or which affect the general health of man or other animals. Such pests as the common house fly (and its relation to typhoid and other diseases), the malarial and yellow fever mosquitos, fever bearing ticks, bot flies, fleas, lice, poultry pests, mange and scab-producing animals will be discussed and studied.

8. **Game Protection and Fish Culture** — **Professor Washburn**
One credit (two hours per week) — First half second semester
Open to juniors and seniors.

Relation of game and other birds, and of various four footed animals, to forest protection. Habits, range, usefulness or the contrary. The manner of protecting the important large and small game, fish and birds. Not given in 1909-10.

FARM STRUCTURES AND FARM MECHANICS

William Boss, Professor of Farm Structures and Mechanics
A. M. Bull, Instructor in Mechanical Drawing
H. B. White, Instructor in Carpentry
J. M. Drew, Instructor in Blacksmithing
J. L. Mowry, Instructor in Practicums
H. J. Thom, Assistant Instructor in Blacksmithing

1. **Farm Mechanics**
Six credits (six hours per week) — First and second semesters
Open to freshmen registered in division B.
Subdivided as follows:

Mechanical Drawing — **Mr. Bull**
Three hours per week. — First semester

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application.

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs, students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

Carpentry — **Mr. White**
Three hours per week. — First semester

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop, students are required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handlers, eveners, cupboards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

Blacksmithing — **Mr. Drew**
Three hours per week. — Second semester

The students are instructed in the management of the forge and fire, and in bending, shaping and welding iron and steel. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools.

Practicums — **Mr Mowry**
Three hours per week. — Second semester

Lectures and practice work on steam and gasoline engines, wells, pumps, pipe fitting, soldering, belt lacing, cement and concrete work.

The practical work will be supplemented by lectures on the properties and strength of wood, steel and cement, quick methods of testing, the construction of camp buildings and bridges, and the comparative prices of materials.

2. MECHANICAL DRAWING — PROFESSOR BOSS AND MR. BULL
Three credits (six hours per week) — First semester
Open to freshmen in forestry.

The work in this course is designed to prepare the student for his work in Forest Engineering. Preliminary work in lettering and projecting. Designs in the location and arrangement of buildings and mills, machinery and shops, creosoting plants and testing laboratories. Water color and tinting. The laboratory work will be accompanied by lectures on practical application of the subject.

3. FOREST MECHANICS — PROFESSOR BOSS, MR. DREW AND MR. WHITE
Three credits (nine hours per week) — Second semester (Feb. 1—Apr. 15)
Open to juniors in forestry.

(a) Blacksmithing: Instruction and practice work in the handling of forge and anvil, the bending work, shaping and welding of iron and steel, the tempering of steel tools, the grinding and care of the axe, etc.

(b) Carpentry: Practice work in the use and care of the tools used in lumbering, saw filing, etc.

4. FARM STRUCTURES — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors.

Lectures and practice work are given in laying out plans for farm buildings. The questions of location, size, convenience, methods of construction, materials, heating systems, water systems, ventilation, sewage disposal, painting, durability, cost, etc., are discussed.

5. FARM STRUCTURES — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to seniors.

Each student selects an imaginary or real farm and makes drawings showing location of buildings, drives, yards, fences, etc., paying particular attention to locating each building properly and planning them so as best to meet the requirements of each individual farm and the means at hand for erecting them. Specifications and estimates of cost of buildings are also made.

6. FARM STRUCTURES — PROFESSOR BOSS
Three credits (three hours per week) — Second semester
Open to juniors.

Lectures and practice work in drawing. Location of farm buildings, drives, yards, etc., architectural designing, the study of plans, fittings and equipment; heating systems, ventilation, floors and wood work, painting and decoration.

7. FARM STRUCTURES — PROFESSOR BOSS
Three credits (three hours per week) — First or second semester
Open to juniors and seniors.

The practical application of the principles outlined in course 3. Each student is required to lay out plans for an imaginary or real house, paying particular attention to location, sanitary conditions, heating, ventilating and general conveniences.

FORESTRY

SAMUEL B. GREEN, Professor of Forestry
E. G. CHEYNEY, Assistant Professor of Forestry
J. P. WENTLING, Assistant Professor of Forestry

1. **GENERAL FORESTRY** — ASSISTANT PROFESSOR CHEYNEY
Three credits — First semester

A brief history of the development of forestry in Europe and America, with the idea of explaining the possibilities of forestry work and the problems which must be solved in this country. The location and brief description of the forests of the world, and more detailed sectional descriptions of the forests of the United States. Lectures and collateral reading.

2. **DENDROLOGY** — ASSISTANT PROFESSOR WENTLING
Three credits — First semester and first half second semester
Open to sophomores.

A general and comprehensive study of the forest trees of the United States. Their classification, characteristics, range, etc., with special attention to prominent and constant characters as a means of ready identification. Special attention to the important timber trees of the United States. Lectures, assigned reading, special papers, field work.

3. **SYLVICULTURE**
Six credits — Both semesters
Open to juniors.

a. **SYLVICS** — ASSISTANT PROFESSOR WENTLING
Three hours per week — First half first semester

Study of the fundamental principles forming the basis of sylviculture, the life history of trees, the influence of environment on tree life in the forest. The origin and determination of forest types, their modification and treatment. Methods of sylvical research. Special attention to the sylvical characteristics of the important commercial species in the United States. Lectures and assigned work.

b. **SYLVICULTURE** — ASSISTANT PROFESSOR WENTLING
Three hours per week — Second half first semester
First half second semester

Theoretical discussion of the different sylvicultural systems of crop production and reproduction. The practice of sylviculture in the United States and abroad. Consideration of the methods of treatment of woodlands preliminary to the actual field practice of these methods in the forest. Lectures and reference work.

c. **SEEDING AND PLANTING** — ASSISTANT PROFESSOR WENTLING
Four hours per week — In Itasca Park

Production, collecting, testing, vitality, storage and sowing of tree seeds. Location and preparation of nurseries and seed beds. Various methods of nursery practice and seeding. Planting. Examinations, report and planting plans. Each student must make a complete report and plan for a specified area. The course aims to give the student sufficient practice to enable him to carry on any work in forest planting. Field work with lectures.

d. **IMPROVEMENT THINNINGS** — ASSISTANT PROFESSOR WENTLING
Four hours per week — In Itasca Park

Practical field work in marking trees for thinning and reproduction cuttings and in making improvement cuttings. Field work.

4. FOREST PROTECTION — ASSISTANT PROFESSOR WENTLING
Three credits (three hours per week) — First semester
Open to juniors.

Consideration of practical measures for the protection of forests from fires, trespass, grazing, etc. State and Federal forest fire and trespass laws. Protection from forest insects and forest tree diseases will be considered in the particular courses for those subjects. Lectures, assigned reading and original papers.

5. FOREST MENSURATION — ASSISTANT PROFESSOR CHEYNEY
Three credits (180 hours) — In Itasca Park
Open to juniors.

The measurement of lumber and of logs by different units; the contents of individual felled trees. The height of a standing tree; the volume of individual standing trees and of whole forests. The rate of growth of individual trees and of whole stands. The formation of log rules, stand tables, volume tables, height tables, and yield tables. A study of cruising methods. Text book, lectures and field work.

6. PACKING
One credit (four hours per week) — In Itasca Park
Open to juniors.

Demonstration and practice under direction in the packing of wagons, boats, canoes, pack animals, and pack sacks. Field lectures and practice.

7. LUMBERING — ASSISTANT PROFESSOR CHEYNEY
Three credits (three hours per week) — First semester
Open to seniors.

History of logging in the United States. Different methods used in different parts of the country; cruising, location of camps, building of roads, felling trees, skidding and transportation of logs from woods to the mill. In connection with this course, the student is obliged to hand in a lumbering report based on data collected by him at some lumber camp. This requires an excursion of about two weeks. Lectures and collateral reading.

8. FOREST MANAGEMENT — ASSISTANT PROFESSOR CHEYNEY
Three credits (three hours per week) — First semester
Open to seniors.

Policy of forest owners: principles governing all forest management; forest valuation; the calculation of soil rent, forest rent and the value of growing stock; the values of even and uneven-aged stands. The different methods of management and the principles underlying them. The outlines of a working plan. Lectures and collateral reading.

9. FOREST BY-PRODUCTS — PROFESSOR GREEN AND ASSISTANTS
Three credits (three hours per week) — First semester
Open to seniors.

In this course a special study is made of the products of the forest other than for timber and fuel. The products studied include cellulose for the manufacture of paper, sugar, tanning materials, turpentine, tar, oils, resin, waxes, gum, creosote, wood alcohol, acetic acid, acetone, essential oils, charcoal, camphor and medicinal products. The subjects of paints and the method for the preservation of wood are also taken up. At the beginning of the course a short time is devoted to a review of organic chemistry, special attention being given to those compounds found in wood or closely related to it. A thesis on some subject relating to the chemistry of forest products is required in this course.

10. FOREST ECONOMICS AND FOREST LAW (Economics Course 1a) PROFESSOR GREEN
Three credits (three hours per week) First semester
Open to juniors.

The development of forestry in the United States and foreign countries; the forest conditions here and abroad and their effect upon the lumber industry; forest policies of different governments. Lectures, collateral reading and reports.

11. BUSINESS LAW PROFESSOR GREEN
One credit (four hours per week) In Itasca Park
Open to seniors.

The fundamental feature underlying contracts; laws governing negotiable papers and their uses; courts and their jurisdiction. The course will deal especially with the application of the subjects to forest conditions.

12. LUMBER MANUFACTURING ASSISTANT PROFESSOR CHEYNEY
Three credits (six hours per week) Second semester
Open to seniors.

SAW MILLS

Capital invested, machinery used, methods, cost of operation, and output of portable and stationary mills. Studies will be made of the up-to-date mills of Minneapolis.

LUMBER GRADING

The part which it plays in the lumber industry; methods and organization leading to uniformity. Study of the rules adopted by the Northern Pine Manufacturers' Association. Several excursions are made to the mills of Minneapolis to study grades and grading in the yards. Economic uses of wood by the various wood using industries.

THE LUMBER MARKET.

Conditions of the market at present and methods which would tend to its betterment and stability. The demands of the market and how they are supplied.

13. FOREIGN FORESTRY PROFESSOR GREEN
One credit (four hours per week) In Itasca Park
Open to seniors.

The development and presentstatus of forestry in foreign civilized countries. Lectures and collateral reading.

14. FOREST WORKING PLANS ASSISTANT PROFESSOR CHEYNEY
Three credits (180 hours) Second semester
Open to seniors.

This subject will be given in the woods. A course of lectures paralleling the field work will deal with the principles and methods involved. Each class will be obliged to work out a complete plan including surveys, sylvicultural plans, estimates, field tables, maps and systems of management. Lectures and field work.

15. FOREST SEMINAR ASSISTANT PROFESSORS CHEYNEY AND WENTLING
Three credits (five hours per week) Second semester
Open to seniors.

This is not, as the term generally implies, a class for the prosecution of original research, but for the purpose of systematically reviewing the whole field of forestry and studying the concrete application of the different branches. Assigned questions and problems; discussions.

16. FOREST ENTOMOLOGY (Entomology 3) DR. FRANKLIN AND MR. RUGGLES
Five credits (six hours per week) Both semesters
Open to juniors and seniors.

This course aims to give the students a thorough, practical training in elementary entomology. They will also be directed in a special study of insects affecting forest and shade trees, and will be encouraged in doing field work, collecting, identifying and becoming familiar with the life history of forest insects.

17. GAME PROTECTION AND FISH CULTURE (Entomology 8) PROFESSOR WASHBURN
One credit (two hours per week) First half second semester
Open to juniors and seniors.

Relatian of game and other birds, and of various four-footed animals, to forest protection. Habits, range, usefulness or the contrary. The manner of protecting the important large and small game, fish and birds. Not given in 1909-10.

18. MATERIALS TESTING LABORATORY (Exp. Eng. 1) PROFESSOR KAVANAUGH AND MR. SHOOP
Two credits (four hours per week) First semester
Open to seniors as an elective.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

19. WOOD PRESERVATION ASSISTANT PROFESSOR CHEYNEY
Three credits (six hours per week) First semester
Open to seniors. Plant Pathology (1) a prerequisite.

The course will consist largely of demonstration work at the plant on the State Fruit Farm. Experiments will be conducted to test the value of different methods of treating, special attention being given to post and pole treatment. The practical work will be supplemented by lectures and collateral reading upon the history of wood preservation, the development of the various methods and a study of the antiseptics used.

20. PHOTOGRAPHY MR. AYER
One credit (four hours per week) First semester
Open to juniors.

Practical work in taking pictures, developing and printing will be supplemented by lectures upon the selection of a lens, the mechanism and uses of the camera and kodak, enlarging and reducing, lantern slides and the mixing of solutions. It is advisable that students provide themselves with kodaks.

FRENCH

1. BEGINNING FRENCH ASSISTANT PROFESSORS ANDRIST AND FRELIN, MADAM BERTIN
Six credits (five hours per week) Both semesters

Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French. Fraser and Squair's French Grammar and Reader; modern texts.

2. INTERMEDIATE FRENCH ASSISTANT PROFESSOR FRELIN AND MADAM BERTIN
Six credits (three hours per week) Both semesters

Open to sophomores, juniors and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.

Francois Advanced French Prose Composition; modern texts will be read, including some of the works of Coppee, Merimee, Dandet, Scribe, etc

GEOLOGY

C. W. HALL, Professor of Geology
E. M. LEHNERTS, Assistant Professor of Geology
F. F. GROUT, Instructor in Geology

1. GENERAL GEOLOGY — PROFESSOR HALL
Three credits (three hours per week — First semester
Open to freshmen.

Comprises (1) geodynamics, in which are set forth the phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement, and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles and lantern slides.

2. PHYSIOGRAPHY — ASSITANT PROFESSOR LEHNERTS
Three credits (three hours per week) — First semester
Open to freshmen.

Discussion of the principles of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.

3. INDUSTRIAL GEOGRAPHY — ASSISTANT PREFESSOR LEHNERTS
Three credits (three hours per week) — Second semester
Open to students who have completed course 1.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and domination climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries affected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. ELEMENTS OF METEOROLOGY — ASSISTANT PROFESSOR LEHNERTS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 or 2.

The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-book, lectures, and reference reading.

5. GEOGRAPHY AND GEOLOGY OF MINNESOTA — PROFESSOR HALL
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

(a) The physical geography of the state in its relation to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the state and the extension of these into general application. (c) The present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

6. **ELEMENTS OF MINERALOGY** PROFESSOR HALL AND MR. GROUT
Three credits (six hours per week) First semester
Open to sophomores, juniors and seniors; the laboratory fee is three dollars.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and of economic minerals; the basis of classification. (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

GERMAN

1. **BEGINNING** PROFESSOR SCHLENKER, ASSISTANT PROFESSOR WILKIN AND JUERGENSEN, MR. BURKHARD, AND MR. WILLIAMS
Six credits (five hours per week) Both semesters
Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.

Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.

2. **INTERMEDIATE** PROFESSOR SCHLENKER, MR. BURKHARD AND MR. WILLIAMS
Six credits (three hours per week) First semester
Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5. It should be followed by course 6 or course 7. Students who obtain credit for this course cannot receive credit also for either course 3 or course 4.

First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe, or Schiller.

3. **SCIENTIFIC INTERMEDIATE** ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) Both semesters
Open to all who have completed course 1; both semesters must be completed before credit is given for the first semester.

First semester: Hodge's German Science Reader (or equivalent). Second semester: Brandt and Day's German Scientific Reading. This course aims to give the student a reading knowledge of German for use in scientific studies.

HORTICULTURE

SAMUEL B. GREEN, Professor of Horticulture
LEROY CADY, Instructor in Horticulture
A. R. KOHLER, Instructor in Horticulture

1. **FRUIT GROWING** MR. CADY
One and one-half credits (three hours) First semester
Open to freshmen registered in division B.

Geography of fruit growing, tilling, fertilizing and irrigation of lands; seed sowing; pollination; diseases and injurious insects and their prevention; storing, harvesting and marketing fruits. Lecture and text-book.

2. **VEGETABLE GARDENING** MR. KOHLER
Three credit (three hours) Second semester
Geography of vegetable growing, tilling, fertilizing and irrigation of lands; seed

sowing; vegetables under glass; pollination; diseases and their prevention; storing, harvesting and marketing of vegetables. Lectures and text-books.

3. PLANT PROPAGATION MR. CADY
One credit (three hours per week) Last half second semester
Open to freshmen.

Development of cultivated varieties of plants and seed testing; propagation of plants by seed, cutting, grafting and budding; the work of the class room is illustrated by orchards, nurseries, forest plantation, gardens and greenhouses on the grounds of the experiment station and by visits to commercial nurseries and greenhouses nearby.

4. NURSERY WORK MR. CADY
Two credits (four hours per week) First semester
Open to sophomores. Elective.

Seedage, layerage, cuttage, graftage, planting, pruning, thinning, storage of nursery stock; tillage of nursery lands; insects and diseases injurious to the nurseries and their prevention. Lectures and practice work.

5. GREENHOUSE MANAGEMENT AND FLORICULTURE PROFESSOR GREEN AND MR. CADY
Three credits (three hours per week) Second semester
Open to juniors and seniors. Elective.

Lectures and laboratory work. Greenhouse construction and management; temperature; soil; watering; benches; propagation; prevention of diseases and extermination of insects in greenhouses; rest and growth periods of plants; plants for greenhouse cultivation.

6. LANDSCAPE GARDENING PROFESSOR GREEN AND MR. CADY
Three credits (three hours per week) First semester
Open to juniors and seniors. Elective.

A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.

7. PLANT BREEDING PROFESSOR GREEN
Three credits (six hours per week) Second semester
Open to juniors and seniors. Elective.

Lectures and laboratory work. The fact and philosophy of variation; crossing of plants and origination of domestic varitetes.

8. SYSTEMATIC POMOLOGY MR. KOHLER
Three credits (six hours per week) First semester
Open to juniors and seniors. Elective.

Description and classification of the varieties of the various fruits with special reference to those varieties adapted to Minnesota; the identification of varieties; judging of fruits; fruit sections of the country; and a brief study of the fruits not taken up in course 1 with their introduction, cultivation, propagation and distribution.

9. SPRAYING MATERIALS AND COMPOUNDS MR. KOHLER
Two credits (one lecture and one three-hour laboratory period per week)
Open to juniors and seniors. Second semester

A study of spraying materials, their preparation and use. Laboratory work consists in preparing a large number of different spraying mixtures, in studying different types of spraying apparatus, and in applying sprays. Students must provide themselves with overalls and jackets for this work.

MATHEMATICS

H. B. Roe, Instructor in Mathematics

1. **Plane Trigonometry** **Mr. Roe**
Three credits (three hours per week) Second semester

Open to those who have completed the algebra and plane geometry of the intermediate year of the School of Agriculture, or equivalent work in approved high schools.

The course includes a short, systematic review of the essentials of algebra and plane geumetry, in which all students must show proficiency, the thorough study of the theory and use of logarithms and of the functions of plane trigonometry, with numerous practical applications. No student who has not completed the subject of Higher Algebra, as given in accredited High Schools, will be admitted to the course.

PSYCHOLOGY

Professor Wilde
Assistant Professor Miner

1. **Introductory Psychology** **Professor Wilde and Assistants**
Three credit hours. First and second semesters

This course is required for all advance work in Psychology and for the teacher's certificate; it also serves an introduction to the courses in philosophy. The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. The work involves text-books, lectures and essays.

2. **Educational Psychology** **Assistant Professor Miner**
Three credit hours. Second semester

Open only to sophomores, juniors and seniors who have completed course 1.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence, with special reference to their bearing on education.

PEDAGOGICS

D. D. Mayne, Professor of Agricultural Pedagogics

1. **Priciples of Teaching** **Professor Mayne**
Three credits (three hours per week) First semester

Open to sophomores in College and students in Normal Course.

This course includes a consideration of the elementary principles of teaching, a study of general methods, and a necial study of methods of teaching industrial subjects. Lectures, assigned readings, discussions and reports.

2. **Industrial Education** **Professor Mayne**
Three credits (three hours per week) First semester

Open to juniors in College and students in Normal Course.

This course includes a short history of industrial education; the present status of industrial education in Europe and in the United States; the place of manual training and home arts in an educational system; the place of agricultural teaching in the public schools; trade and vocational schools.

POLITICAL SCIENCE

1. **The American Government** — Professor Schaper and Mr. Allin
Three credits (three hours per week) — Repeated each semester
Open to sophomores, juniors and seniors.

An elementary course in American government intended as a preparation for the advanced courses in political science, for teaching in secondary schools and for good citizenship; a study of the organization and actual working of the national and local governments; a series of lectures on the nature and origin of the American governmental system precedes a study of the text and assigned topics; special attention will be given to important statutes on naturalization, organization of the judiciary, and of executive departments, interstate commerce, trusts, etc. Text, lectures, and special topics.

3. **The Elements of Jurisprudence** — Professor Schaper
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

A study of those human relations requiring legal regulation considered from the American point of view; the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is inteded for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.

RHETORIC

R. C. Lansing, Assistant Professor of English

1. **Rhetoric, General** — Assistant Professor Lansing
Three credits per semester (three hours per week) — First and second semesters
Open to freshmen.

The course includes theme writing with lectures and recitations on the principles of composition, and the analysis of good expository writing with reference to construction, sentence and dictation.

2. **Rhetoric, Advanced** — Assistant Professor Lansing
Three credits per semester (three hours per week) — First and second semeters
Open to students who have passed in Course 1.
First semester: Argumentation, briefing, and debate.

Second semester: Thesis writing and the form of public speaking are emphasized as training for the work in constructive English likely to be required in later professional life. Conference with the instructor is a part of the course. If a sufficient number of students desire it, a course in the short story will be given.

SOILS

Harry Snyder, Professor of Soils
W. H. Frazier, Instructor in Soils
A. D. Wilhoit, Instructor in Soils

1. **Soils and Fertilizers** — Professor Snyder and Mr. Frazier
Two credits (five hours per week) — First semester
The object of this course is to familiarize the student with the elementary

principles of soil fertility. The soil is studied from physical, chemical, bacteriological and geological points of view. Some of the topics are: the physical properties of soils and their influence upon crop production and chemical change; the chemical composition of soils; the organic compounds of soils and their effect upon fertility; the essential elements of plant food, their occurrence in the soil and availability; the losses and gains of soil nitrogen; farm manures; commercial fertilizers; the draft of farm crops upon the soil; rotation of crops as affecting fertility; judging, rating and scaling of soils. Laboratory practice forms a feature of the work and each student is requested to bring samples of soils from his home farm for this purpose.

2. SOIL FERTILITY AND SOIL MANAGEMENT — PROFESSOR SNYDER

Two credits (two hours per week) — Second semester

Open to freshmen registered in division B.

Open to juniors and seniors. Course 1 Prerequisite.

Lectures:—This is an advanced course, treating of the relation of soil fertility to crop production. Some of the chief topics considered are: rock decay; soil types produced from different kinds of rocks; soil solutions; soil organisms and their products; soil faults and their correction; soil surveys; the permanent improvement of soils; influence of different types of farming upon soil fertility; soil management; causes of unproductiveness of soils and the general relationship of soils to plant life. The food requirements and physical condition of soils for the production of various farm crops, the development and conservation of the natural fertility of the soil and the commercial sources and forms of plant food with their economic uses are also studied.

3. THE ANALYSIS OF SOILS AND FERTILIZERS. — PROFESSOR SNYDER, MR. FRAZIER AND MR. WILHOIT

Six credits (six hours per week) — Both semesters

Open to juniors and seniors. Elective.

Laboratory courses—(a) and (b) each one semester.

(a) The chemical analysis of soils.

Laboratory practice in the chemical analysis of soils and the study of the chemical methods employed in soil investigations. Particular attention is given to the study of the organic compounds of soils, and an opportunity is offered for the study of experimental soil work applied to field investigations.

(b) The physical analysis of soils.

Laboratory practice in the physical analysis of soils by means of elutraition and sedimentation methods as modified by the centrifuge. Course three is intended for students who desire to make a specialty of the subject of soils.

VEGETABLE PATHOLOGY AND BOTANY

E. M. FREEMAN, Professor of Vegetable Pathology and Botany
W. L. OSWALD, Instructor in Vegetable Pathology

1. PLANT PATHOLOGY — PROFESSOR FREEMAN

Three credits (six hours per week) — First semester

Open to juniors.

General outline of the diseases of plants due to fungus organisms; a special study of the life histories and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Thesis work and specialization according to the interests of the students; for instance, for forestry students, diseases of forest trees; for agronomy students, diseases of cereal crops, etc. Special attention is paid to methods of prevention and cure. Lectures, reference reading, laboratory and thesis work.

2. **WOOD TECHNOLOGY** PROFESSOR FREEMAN
Three credits (six hours per week) Second semester
Open to sophomores in forestry course.

A comprehensive study of the structural features of types of the most important woods of commerce; special reference to the woods of the United States, and particularly to those of this state. Structural development in the life of the tree. Physical and mechanical characters as related to the structural features. A comparative study of a large number of woods with a view to identification and classification. Thesis work on the detailed studies in the histology of the woods.

3. **AGRICULTURAL BOTANY** PROFESSOR FREEMAN
Three credits (six hours per week) First semester
Open to all who have completed course 1, General Botany.

This course will include a study of weeds and weed seeds and methods of detection and eradication. Special study of impurities of Minnesota seeds will be made. It will also include a study of soil botany, particularly the economic phase of leguminous nodules and a life history study of agricultural crops.

4. **ADVANCED PATHOLOGY** PROFESSOR FREEMAN
Six credits (six hours per week) First and second semesters
Open to all who have completed Mycology or Course 1 in Plant Pathology. Elective.

Special cultural and laboratory methods in Plant Pathology. Special practical problems in plant diseases. Laboratory reference and lecture work.

5. **ADVANCED PATHOLOGY** PROFESSOR FREEMAN
Graduate work. Open to those who have completed three years' work in Academic Botany and one years' work in Plant Pathology. Mycology is required as a prerequisite course. Special problems in the investigation and prevention of plant diseases. This course is designed for minor or major subject for candidates for advanced degree.

VETERINARY

M. H. REYNOLDS, Professor of Veterinary Medicine and Surgery
C. C. LIPP, Assistant Professor of Veterinary Medicine and Surgery
C. A. PYLE, Instructor in Veterinary Science

1. **VETERINARY WORK** PROFESSOR REYNOLDS AND DR. PYLE
Two credits (three hours per week) First semester
Open to freshmen registered in division B.

During the freshman year class B students take up a course of study in veterinary medicine, the purpose of which is to fit them for intelligent care of their farm stock. In this course the teaching is done by means of text-book, lectures, reviews and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of stereopticon, charts, manikin of horse, skeletons and various other appliances. The work covers the following subjects: elementary anatomy; elementary pathology; cause and prevention of diseases; diagnosis and treatment of common diseases; examination for soundness; and a final short course on common medicines, studying their effects, uses and doses. At the hospital of clinics students are enabled to learn the elements of diagnosis for common diseases and forms of lameness.

2. **ANATOMY OF DIGESTION** PROFESSOR REYNOLDS AND DR. PYLE

One and one-half credits (three hours per week) First half second semester

Open to juniors and seniors. Elective. Given in alternate years 1909–1910.

Comparative anatomy of the digestive organs, dissection, collateral reading and recitations. Chauveau's Comparative Anatomy is used for freference and comparison.

3. **PHYSIOLOGY OF NUTRITION** ASSISTANT PROFESSOR LIPP

One and one-half credits (three hours per week) Last half second semester

Open to juniors and seniors. Elective. Given in alternative years, 1909–1910.

This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, source of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work, but students are required to do collateral reading.

4. **ANATOMY OF LOCOMOTION AND CONFORMATION** DR. PYLE

One and one-half credits (three hours per week) First half second semester

Open to juniors and seniors. Elective.

Given in alternate years, 1910–1911.

This course deals with the anatomy of locomotion. The bones, articulations and muscles involved in locomotion and conformation are studied by text-book, dissection and collateral reading. Shoeing, diagnosis and treatment of common forms of lameness may be included in course three. Strangeway's Veterinary Anatomy is used as a text-book and Chauveau for reference.

5. **COMMON DISEASES** PROFESSOR REYNOLDS

One and one-half credits (three hours per week) Last half second semester

Open to sophomores, juniors and seniors. Elective.

This course covers causes, prevention, and deals with common and serious diseases of domestic animals.

ZOOLOGY

HENRY F. NACHTRIEB, Professor of Animal Biology
CHARLES P. SIGERFOOS, Professor of Zoology
JOHN C. BROWN, Assistant Professor of Animal Biology
HAL. DOWNEY, Assistant Professor of Animal Biology
OSCAR W. OESTLUND, Assistant Professor of Animal Biology
CHARLES E. JOHNSON, Instructor in Animal Biology

1. **GENERAL ZOOLOGY** PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS OESTLUND, BROWN, DOWNEY, AND MR. JOHNSON

Six credits (six hours per week) Both semesters

Open to all; the laboratory fee is three dollars per semester

This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the star-fish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's Manual of Zoology.

2. MORPHOLOGY OF INVERTEBRATES — PROFESSOR SIGERFOOS AND MR. JOHNSON

Six credits (six hours per week) — Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The object of this course is to familiarize the student with the methods and principles of zoology through an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course one.

3. ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY — PROFESSOR NACHTRIEB AND ASSISTANT PROFESSOR DOWNEY

Six credits (six hours per week) — Both semesters

Open to those who have completed course 1; the laboratory fee is three dollars per semester.

In this course are taken up the development and minute structure of the animal as an organism built up of tissue combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes and laboratory work.

4. COMPARATIVE ANATOMY OF VERTEBRATES — ASSISTANT PROFESSOR BROWN AND MR. JOHNSON

Six credits (six hours per week) — Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The first semesters' work is based opon a study of chordates, cartalaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes and laboratory work. Required text-books: Davidson's Mammalian Anatomy and Burkholder's Anatomy of the Brain.

5. GENERAL PHYSIOLOGY — PROFESSOR NACHTRIEB

Six credits (three hours per week) — Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functiona features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relations to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

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The School of Agriculture

The School of Agriculture

FACULTY

Cyrus Northrop, LL.D., President.
J. W. Olsen, B.S., Dean
Dexter D. Mayne, Principal
J. A. Vye, Secretary
J. M. Drew, Registrar
Fannie C. Boutelle, Preceptress
Anna M. Smith, Librarian

AGRICULTURE

Andrew Boss, Agriculture
C. P. Bull, B.Agr., Assistant in Agriculture
A. D. Wilson, B.S. in Ag., Assistant in Agriculture
L. B. Bassett, Farm Machinery
T. P. Cooper, B. S. in Agr., Assistant in Agriculture

AGRICULTURAL CHEMISTRY

Harry Snyder, B.S., Agricultural Chemistry
J. A. Hummel, B. Agr., Assistant in Agricultural Chemistry
Agnes Ericson, Asistant in Agricultural Chemistry
Cornelia Kennedy, B.A., Assistant in Agricultural Chemistry
Walter L. Badger, Assistant in Agricultural Chemistry

AGRICULTURAL ENGINEERING AND PHYSICS

J. T. Stewart, B.S., Agricultural Engineering, Physics
A. L. Ewing, M.S., Assistant in Agricultural Physics

ANIMAL HUSBANDRY

Andrew Boss, Animal Husbandry
J. M. Drew, Poultry
D. A. Gaumnitz, M.Agr., Assistant in Animal Husbandry
J. L. Edmunds, B.Sc., in Agr., Assistant in Animal Husbandry
W. F. Handschin, Asistant in Animal Husbandry

DAIRY HUSBANDRY

T. L. Haecker, Dairy Husbandry, Animal Nutrition
A. J. McGuire, B.Agr., Assistant in Dairying
Geo. P. Grout, B.S. in Agr., Assistant in Dairy Husbandry
E. K. Slater, Assistant in Dairy Husbandry

DOMESTIC ART

Margaret J. Blair, Sewing, Household Art
Edith Staples, Assistant in Sewing
Avis Hall, Assistant in Sewing
Greta Smith, Assistant in Sewing

DOMESTIC SCIENCE

Juniata L. Shepperd, M.A., Cooking, Laundering, Home Economics
Mary L. Bull, Assistant in Cooking, Laundering
May McDonald, B.S., in Home Economics, Assistant in Cooking

ENGLISH

R. C. Lansing, M. A., English
Estelle Cook, Assistant in English
Ethel E. Bush, B.A., Assistant in English

ENTOMOLOGY AND ZOOLOGY

F. L. Washburn, A.M., Zoology, Entomology
A. G. Ruggles, M.A., Assistant in Entomology
H. J. Franklin, B.S., Ph.D., Assistant in Entomology

FARM STRUCTURES AND FARM MECHANICS

Wm. Boss, Farm Structures, Farm Mechanics
J. M. Drew, Blacksmithing
A. M. Bull, Drawing, Farm Buildings
H. J. Thom, Assistant in Blacksmithing
Thos. Sewall, Assistant in Drawing
H. B. White, B.S. in Agr., Assistant in Carpentry
J. L. Mowry, Assistant in Mechincal Practicums

HORTICULTURE AND FORESTRY

S. B. **Green**, B.S., Horticulture, Forestry
LeRoy **Cady**, B.S., in Agr., Assistant in Horticulture
E. G. **Cheyney**, A.B., Assistant in Forestry
A. R. **Kohler**, B.S.A., Assistant in Vegetable Gardening
J. P. **Wentling**, M.A., Assistant in Forestry

SOILS

Harry **Snyder**, B.S., Soils
W. H. **Frazier**, B.S., Assistant in Soils
A. D. **Wilhoit**, M.A., Assistant in Soils

VEGETABLE PATHOLOGY AND BOTANY

E. M. **Freeman**, Ph.D., Vegetable Pathology, Botany
W. L. **Oswald**, Assistant in Agricultural Botany

VETERINARY SCIENCE

M. H. **Reynolds**, M.D., D.V.M., Veterinary Science
C. C. **Lipp**, D.V.M., Comparative Physiology
C. A. **Pyle**, B.S., D.V.M., Assistant in Veterinary Science

SCHOOL

J. A. Vye, Farm Accounts
D. D. Mayne, Practicums
Grace B. **Whitridge**, Physical Training
Karl A. **Machetanz**, B.A., History, Director of Gymnasium
Fannie C. **Boutelle**, Social Culture
D. B. **Howell**, Ph.B., Mathematics
Edward **Sigerfoos**, Ph.B., Capt. 5th U. S. Infantry, Military Science and Tactics
Martha B. **Moorhead**, M.D., Lecturer in Domestic Hygiene
Mary L. **Coffin**, Music
Gertrude V. **Colllins**, Assistant in Farm Accounts
H. B. **Roe**, B.S., in Eng., Mathematics

Committees, School of Agriculture

Library: Mayne Reynolds, Snyder, Smith, Green.
Catalog: Vye, Snyder, Drew.
Military Drill: Sigerfoos, Green, Haecker
Entertainment: Mayne, Boutelle, A. Boss.
Health: Reynolds, Mayne, Boutelle, Washburn.
Dairy School: Haecker, Wm. Boss, Snyder.
Short Course for Farmers: Mayne, A. Boss, Green.
Auditing: Reynolds, Hummel.
Athletics: Green, Mayne, Machetanz.

The School of Agriculture

TIME OF OPENING

The School of Agriculture will open Monday, October 4th, 1909, and close March 23rd, 1910. The fall term closes at 4:30 p. m., Thursday, December 23rd, and the winter term begins Monday, January 3rd, 1910.

Instruction begins promptly at the opening of each term, and students should be present the first day of the term and remain until the close of the term.

Students are advised to correspond with the registrar of the school, J. M. Drew, University Farm, St. Paul, Minnesota, prior to coming to the institution and to make the necessary preliminary arrangements for registration. Students registered in the fall term will not be received after the second day of the winter term, unless a reasonable excuse is presented for the delay.

LOCATION

The School of Agriculture is located on University Farm, St. Paul, Minnesota, about midway between the business portions of the cities of St. Paul and Minneapolis. Directions for reaching the school are given on page 9. The School of Agriculture is a part of the University of Minnesota and is governed by the University Board of Regents.

PURPOSE

The School of Agriculture was organized in 1888 with the object of giving a practical education to the young men and women who are unable to pursue the full college course in agriculture. It offers a pratcical course of study designed to fit young men and young women for successful farm life, and aims to give to its students the necessary preparation for useful citizenship.

COURSE OF STUDY

The course of study offered covers a wide range of subjects and is largely technical in character, but provision is made for some instruction in English and mathematics. The course is briefly outlined on pages 15 and 16. Instruction is given in the work shops ,laboratories, barns and fields, as well as in the class room. The course requires three winters of six months each for completion, and is co-educational. Much of the work is taken in common by the young men and the young women. Some of the subjects, such as blakcsmithing, carpentry, field work, handling grain and machinery are taken by the young men, while the young women pursue cooking, sewing, laundering and household art. The methods of instruction tend to educate students toward the farm instead of away from it, to develop in them a love for farm life by showing them its possibilities. In this respect the school has been very successful as over 72 per cent of its graduates continue agricultural pursuits.

HOW TO GET TO THE SCHOOL

Check all baggage to St. Paul or Minneapolis and bring checks to the school.

A charge of 25 cents is made by the school teams for transporting trunks at the opening of the school. No charge is made for the return of the baggage, at the close of school, provided it is ready to go on the days assigned.

Monday and Tuesday, October 4th and 5th, members of the Y. M. C. A., wearing lettered badges, will be at the Union Station in St. Paul, and at the Union, Milwaukee, Great Western, Soo and St. Louis Stations in Minneapolis to meet and direct new students. Take the Como-Harriet or Como-Hopkins car from either St. Paul or Minneapolis and get off at Commonwealth avenue.

ADMISSION

All male students are required to have had six months' farm practice before entrance.

Parents are advised not to send pupils under seventeen years of age.

Students who have completed eighth grade work in the common schools are admitted without examination.

Applicants for admission who do not have state certificates or county diplomas showing completion of eighth grade work should send to the registrar for certificates of admission which, when properly filled out by former teachers or superintendents, will be accepted in place of entrance examinations.

Applicants whose home schools do not afford complete instruction in the common branches may be admitted with not more than two conditions which must be removed according to instructions given the student upon admission.

Students from city or grade schools will not be admitted before finishing eighth grade work nor until their former school records have been passed upon by the registrar. These records must be presented at least three weeks prior to the opening of the school.

State High School Board Certificates are accepted for work in English, physiology, algebra, geometry and civics, or credits of 75 per cent or more received on State Teacher's examinations.

HOME LIFE ON THE CAMPUS

The life of the students while attending the School of Agriculture is subject to supervision.

The home life of each student is carefully guarded, and everything done to promote a healthful, moral atmosphere.

The use of tobacco and spirituous liquors of all kinds is strictly forbidden. No person will be admitted as a student who is known to have the cigarette habit.

Upon entrance students are provided with a copy of the rules.

Any one not in accord with these restrictions and not willing to lend a hand toward a strong moral growth should not come to the School of Agriculture.

CLASSIFICATION OF STUDENTS

No student with incomplete C or preparatory work, or more than one incomplete B subject will be classified as an A, excepting high school graduates.

No student with incomplete preparatory work, or more than one incomplete C subject, excepting high school graduates, will be classified as a B.

No student with incomplete C or preparatory work will be made a commissioned military officer.

STUDENTS IN DORMITORIES

The Principal of the School of Agriculture has charge of the boys in their dormitory and social life, and the Preceptress has charge of the girls in their dormitory and social life, under such regulations as they may make.

From 8:15 a. m. to 4:30 p. m. students not at recitation or chapel are expected to be in their rooms or the library studying or reading, also after 7 in the evening.

The rooms shall at all times be quiet, especially in the evening, so that no student may be disturbed.

The cadet officers shall make daily inspection of the boys' dormitories, under proper supervision of the instructors.

HOLIDAYS

On Lincoln's birthday, Februrary 12th, the regular classes of the last two periods in the forenoon will be omitted and a suitable program substituted.

Washington's birthday, February 22nd, will be observed by appropriate exercises.

On Thanksgiving day no classes will be held, but school will continue as usual on Friday and Saturday following.

REQUIREMENTS FOR GRADUATION

First—The completion of the prescribed course of study with an honorable standing in deportment.

Second—An essay of not less than one thouasnd words upon a topic connected with agriculture or home economics.

Third—For young men, a practical experience in field work at the University Farm or elsewhere, as shall appear in reports received from responsible sources.

FEES

With an exception of an entrance fee of $5 to residents of Minnesota and $10 to non residents, the school makes no charges.

EXPENSES

The necessary expenses for the year do not exceed $85. This amount does not include the cost of the required military suit for the young men, traveling and personal expense.

The cost to the student for board, heat, light and laundry is the actual cost of maintaining the table (including management), and caring for the buildings. This has not exceeded $3 per week. Each month's board is paid in advance. The buildings are all lighted by electric lights and warmed by steam. The sleeping rooms are each furnished with a bedstead, mattress, dressing bureau, chairs and table.

No deduction in charge is made for absence of less than five days. If students are compelled to be absent for that length of time they are allowed half rates if they make arrangements before leaving.

Text-books are furnished at a rental of $2 per year to students who do not desire to purchase.

A gymnasium fee of 25 cents per term is charged all students.

Each student is required to pay for breakage of apparatus used in practical work.

A competent nurse is kept on the ground to care for the sick. To meet this expense each student pays $1 per term.

For the purpose of supplying, calcimining and painting the sleeping rooms, a reserve fund is created by assessing each one occupying them $2.00.

A deposit of $5 is required of each student, as a guaranty for the return of all books and other articles borrowed. This deposit is not returned until the student severs his connection with the school.

On entering school the student makes a payment of $5 entrance fee; $12 board; $1 book rent and reading room; 25 cents gymnasium fee; $1 maintaining nurse; $2 reserve fund; $5 deposit; total $26.25.

All male students are required to provide themselves with the prescribed uniform, which consists of navy blue blouse, trousers and cap, and is as neat and economical a dress as the student can obtain. The suit complete, to measure is furnished under special contract for $14.50.

Each student provides four sheets, one pair of blankets, one quilt, one bed spread, one pillow, three pillow cases, towels, napkins, comb and brushes, one glass tumbler, and one teaspoon.

An assignment of rooms will be made at 9 a. m., March 19th, which will hold good until 8 p. m., the first day of the following school year. Students wishing to retain their rooms, after vacation, must be present when the second term opens, or pay one-half the price of board and room for the time they are late. Students arriving after the dormitories are filled are compelled to find rooms elsewhere, but are allowed a rebate of $3 per month.

HOSPITAL FUND

The Hospital Fund will be expended under the general direction of the Health Committee.

This fund insures for those contributing to it, the care of regular nurses and such medicines and materials as the regular nurses may use.

It does not provide medical treatment by physician.

It does not provide hospital expense of students rooming off the campus or away from the institution. Students rooming off the campus are not expected to contribute to this fund.

It does not provide for special nurses if such be required by reason of serious or long continued illness except as provided for in the following rule:

RULE

Adopted by the Health Committee March 9, 1909.

"After usual and necessary running expenses connected with the Hospital Fund have been taken care of, any available balance may be used for paying special nurses or other extraordinary expenses. Any balance still due such special nurses shall be paid by students requiring such extra help and pro-rated according to the number of days attendance for each.

"A dispensary fee of $.25 for each office service by nurses will be collected from those who have not contributed to the hospital fund.

"The regular hospital fee is collected from dining room help the same as for students and this help is then entitled to nurse care on the same basis as students."

LIBRARY

The Agricultural Library is well equipped for supplying the needs of both undergraduate and graduate students. It contains nearly 15,000 volumes of general and technical literature, government reports, etc., besides 4000 unbound pamphlets, bulletins, and reports. The general subject and author card index and the index of publications of the state experiment stations are always at the disposal of all students to aid them in locating the various sources of information which the library affords.

There are complete sets of all the standard encyclopedias and dictionaries and files of over 225 popular and technical magazines and periodicals.

The librarian and her assistants are always ready and glad to give whatever assistance they can, both to those interested in special research work and to those doing regular reference work in connection with their classes. All those wishing to read or study are made welcome and given whatever privileges the library can provide.

ZOOLOGICAL MUSEUM

This is in the third story of the Main building and connecting with the lecture room of the entomologist. It contains, one of the finest collections of birds in the Northwest, a large series of mammals, shells, anatomical models, etc., all used in class instruction. One case is given up to models of injurious insects and a collection of spray pumps, nozzels, etc., showing the various makes on the market. Another case is devoted to a beautiful series of Minnesota fishes, reptiles and amphibians, and on two sides of the large room devoted to museum purposes are cases containing thousands of pinned insects. Friendsof the institution who are inclined to donate zoological specimens may rest assured that they will be properly installed and given the best of care.

STUDENTS' DEBATING SOCIETIES

Students are urged to unite with one of the literary societies of the school for both pleasure and profit. It affords a training in conducting meetings, parliamentary laws, and public speaking obtainable in no other way. Credit is given for the work as it is under the supervision of one of the instructors in the English department.

LECTURE COURSE

During the school year, a lecture and entertainment course, usually consisting of six lectures and concerts, is given in the chapel at a cost of one dollar for the series for reserved seats. These entertainments are strictly high grade, and furnish a pleasant relaxation from school work, as well as mental stimulus.

The following program, which was provided during the past year, shows the general character of the entertainments:

November 6,	A Russian Nobleman's Story of Siberian Exile and Escape,	Count Alexander M. Lockwitzky
November 13,	Music,	The Dunbar Company
December 18,	Character Studies from Life,	John B. Ratto
January 8,	Lecture Recital,	Paul M. Pearson
January 22,	The Story of LeClaire,	N. O. Nelson
February 12,	Music,	Hruby Brothers
March 13,	Violin Recital,	Alexander Petschnikoff

STUDENTS' CHRISTIAN ASSOCIATIONS

The Young Men's and the Young Women's Christian Associations have for their objects, social fellowship and moral and spiritual development. To this end two receptions are held each year, and Bible classes are held Sunday mornings at 8:30. A general religious service is held each Sunday at 3 p. m., and a mid-week prayer meeting each Wednesday, at 6:30 p. m. The associations are non-sectarian, so that all students may find in them an opportunity for Christian activity and mutual helpfulness.

Course of Study

FIRST (C) YEAR

FIRST TERM

Agricultural botany [4]
Drawing [2]
Music [2]
Farm Mathematics [5]

*Blacksmithing [2]
*Carpentry [2]
Military Drill [2]
Agriculture [3]
Gymnasium [2]
*Practicums [2]

or

*Cooking [2]
Physical training [2]
*Sewing [2]
Social culture [1]
Field agriculture [3]

SECOND TERM

Agricultural botany [5]
English [5]
Music or literary society work [2]
Comparative physiology [5]
Study of breeds [5]

*Carpentry [2]
*Drawing (farm buildings) [2]
*Blacksmithing [2]
Military drill [2]
Gynasium [2]
*Practicums [2]

or

*Laundering [2]
*Drawing farm houses [2]
Physical training [2]
*Farm accounts [2]

SECOND (B) YEAR

FIRST TERM

English [2]
Agricultural physics [5]
Dairy chemistry [2]

*Dairy husbandry [2½]
Dairy lectures
Dairy practice
Dairy breeds

Fruit growing [3]
Music [2]

*Farm Accounts [4]
*Stock judging [1]
Breeding [2]
Military drill [2]
Gynasium [1]

or

*Farm Accounts [2]
*Cooking [2]
Household art [1]
Physical training [2]
*Sewing [2]

SECOND TERM

English [2]
Agricultural chemistry [5]

*Dairy husbandry [2½]	Dairy stock lectures Dairy practice Dairy feeding

Music [2]
Agricultural physics [5]
Vegetable gardening [3]

Field crops [5] Military drill [2] Gymnasium [1]	or	*Cooking [2] Home management [1] Physical training [2] *Sewing [2]

THIRD (A) YEAR

FIRST TERM

Agricultural chemistry [7]
Forestry [3]
Zoology [3]
Poultry [3]
Algebra [5]

Handling grain & machinery [1] *Veterinary science [2½] Gymnasium [1] Music or military drill [2]	or	*Cooking [2] *Sewing [2] Music [2] Home nursing optional

SECOND TERM

Civics or English [4]
Plant propagation [3]
Entomology and insect collection [3]
†Algebra [5]

Dressing and curing meats [1] *Stock judging [1] Feeding [3] Soils and fertilizers [5] *Veterinary science [2½]	or	Meats [1] Home economy [1] *Cooking [3] Domestic chemistry [3] *Sewing [3] Domestic hygiene [1]

*Figures in brackets indicate the number of periods per week in which the subject is pursued. All work in subjects marked thus * extends through double time in the daily program.

†Required of those expecting to enter the College of Agriculture.

VACATION WORK

It is essential that the student should do some work of a practical nature during the vacations following the first and second school years respectively. Students will be given a credit for this work just the same as for other school work. Blanks giving an outline of the work in detail and blanks for certification are furnished to all students.

It is expected that all the boys in the school will devote their vacations to actual farm work, or to some form of agricultural work.

ASSEMBLY

On each school day at 11:40 a. m., the students assemble in the chapel. After the opening exercises brief talks are given by the principal, members of the faculty, or invited guests.

During the year the list of speakers include prominent state and national officials, business men, particularly those connected with the agricultural industries, professional men, prominent clergymen of all denominations, educators from other institutions, and successful farmers. It has been found that this plan gives to the students an opportunity to hear men of prominence discuss a wide range of topics, many of which relate to rural and agricultural problems.

Members of the graduating class at times present essays, and discuss topics as assigned.

Courses of Instruction

AGRICULTURAL BOTANY

This course consists principally of a study of the flowering plants. The practical side of the subject is emphasized by the study of the plants usually found on the farm. Some work is done in the greenhouse which enables the students to see more clearly the functions and different parts of the plant. This course includes a botanical study of weeds found on the farm and the botanical features concerned in methods of eradication. Determination of weed seeds found in grain and grass mixtures is also a part of this course. Plant diseases such as rusts, smuts potato diseases, etc., are studied and the best preventive methods are discussed. Some instruction is given in the use of the compound microscope.

AGRICUTURAL CHEMISTRY

In agriculture chemistry one term is given to the study of the elements and compounds which are or the most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in every-day life. Laboratory practice forms a prominent feature of the work. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemisty of animal nutrition, digestibility and value of foods, and the laws of governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life, form the basis of this work.

AGRICULTURAL PHYSICS

In this department it is the aim to enlist the student's interest in a more keen appreciation of the principles that underlie the practices of his vocation. To this end the facts with which he is already somewhat familiar are used to reach the fundamental law. For exmaple, from his knowledge of the relation of weight to bulk in grains, soils and water, he is led to a knowledge of volume, mass, density, weight, force, draft, specific gravity, and fluid pressure. In the laboratory he makes definate determinations along these lines. Likewise the somewhat vague and indefinite notions the young people have from their use of pulleys, eveners and other farm machinery, form fitting stepping stones to definite mathematical results readily reached by them under proper guidance.

The varied questions of soil physics, soil formation, the movements of water and air through soil, soil temperatures, soil grains and granules, and pore space, are matters studied from the practical side and used as avenues to far reaching laws.

AGRICULTURE

It is proposed in teaching this subject to cover the elementary principles governing soils, and field and farm management. The work covers the origin, formation, and cultivation of soils; the movement and control of soil moisture;

selecting and planning farms; subdividing fields; drainage; irrigation; roads; fences; buildings; water supply; groves and wind breaks; farm life; the relations of science to agriculture; a general consideration of farming as a buisness; and methods of farming.

ELEMENTARY ALGEBRA

Beginning algebra is offered throughout the senior year, required of all students intending to enter college and optional for others. This work covers Well's New Higher Algebra or equivalent texts through simple equations of one unknwon quantity. Special attention is given to literal notation, negative numbers, factoring, fractions, and the simple equation.

BLACKSMITHING

The students are instructed in the management of the forge and fire, and in bending, shaping, and welding iron and steel. They are required to make links, rings, hooks, bolts, clevises, whiffletree-irons, tongs, cold-chisels, punches, in short, become familiar with all the operations necessary to enable them to do their own repair work, when they return to the farm. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools. The forges used are such as any farmer can make for himself, and each student is taught to make his own tools, so that he will be able to furnish his shop with very little outlay.

BREEDING

Students receive instruction in the principles that govern breeding, on the influences that affect heredity and in the care and management of breeding stock. Pedigree receives careful consideration, and each student is required to make out pedigrees of two or more pure bred animals. They are also required to become familiar with methods of keeping live stock records of all kinds.

CARPENTRY

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction,—framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop students are required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc.

CIVICS

During the last term of the course students receive instruction in this science, and graduate with a good undertsanding of the origin, necessity, nature, and various forms of government, and the machinery employed to carry on public works, establish justice and provide for the common defense; of the organization and management of local institutions—the town, the village, the city and the county; the manner in which states are created and the affairs administered; the three departments—legislative, judicial, and executive—and the functions of each; the interdependence of the state and its citizens, as well as the powers and obligations of each, by due attention to which the state may be strengthened and the condition of its citizens ameliorated.

The relations of the state to the general government, the constsitution and the power it confers and the provisions for amendements, are taught. The more important principles of commercial law, including contracts, agency, partnership, corporations, and commercial paper, receive attention. Instruction is also given n the United States method of surveying public lands.

COMPARATIVE PHYSIOLOGY

During the first year students take one term of applied physiology. This is an effort to connect technical physiology with the necessities of every day life. The work includes a study of the general plan and structure of the body and the various individual tissues of which is composed; also sources of heat and energy digestion, and the relation of food materials to the various tissues of the body. Considerable attention is given to diseased and innutritious foods, food adulteration and naricotics. The circulation is studied with special reference to the relation of the blood and lymph to tissue nutrition and tissue waste.

Accidents, including poisoning, are studied for the purpose of giving a practical knowledge of what to do in emergencies. Considerable attention is given to the subject of clothing, the various materials in use being considered with reference to fitness for special purposes. Some time is also given to the study of common physiology, of the organs of circulation, digestion, respiration, nervous system, and the relations of bacteria to the common diseases, especially such diseases as consumption, typhoid fever, etc. A brief study is also given to the subject of digestion in the lower animals.

The class work is illustrated by means of large charts, skeletons, manikins, and dissection. Importaant points of difference between human and animal physiology are pointed out in preparation for the third year's work in the veterinary class. Matters of home and personal hygiene are interwoven with the physiology work.

COOKING

Cooking extends through five terms of the currirculum. The subjects covered in each term are as stated below:

First term, C year: Furniture and equipment needed in a home kitchen; best methods of managing kitchen work, caring for kitchen and dining room; utensils, furniture, etc.; the place of measuring and weighing in cookery; the preparation and serving of vegetables, cereals and bread.

First term, B year: Cooking is again taken up, the special topics being preservation of fruits and vegetables by canning, preserving, pickling and jelly making. The selection, preparation, and serving of meats of all kinds is also considered. A sufficient amount of practical work is given in each case to illustrate the principles brought out. A special study of table service is begun during this term and extends through the year, a practice dinner being given by a portion of the class in the class dining room each month.

Second term, B year: Eggs are considered as to selection, preservation, food value, different ways of cooking and serving. The preparation and serving of soups and beverages is considered together with their food value. The subject of salads is considered in a similar way.

First term, A year: This is devoted to the marketing and care of food. The preparation and serving of dairy foods, and made over dishes and dishes for invalids receive special attention.

Second term, A year: This devoted to the preparation and serving of desserts and to the study of food rations, dietaries, bills of fare, confections, etc. A free use is made of the U. S. Bulletins during the year in the hope of arousing a greater interest in the food question.

DAIRY CHEMISTRY

The chemical and allied changes which take place in the handling of milk and ist manufacture into butter and cheese, and the application of these principles to the production of milk and its products form the basis of this work.

DAIRY HUSBANDRY

Farm dairy lectures—A course of lectures is given in farm dairying, giving instruction in the care of milk and utensils, explaining the pinciples involved in creaming milk by the gravity and centrifugal process and giving full instruction in gard to running farm separators and the manufacture of butter and cheese in the farm dairy.

During the last half of the first term students receive instruction in regard to the characteristics of the various breeds of dairy cattle, their origin and comparative adaptability for the dairy. Lectures are given upon the points desirable in animals intended for the dairy. The students have practice work in judging dairy stock.

During the second term lectrues are given covering both the scientific and practical phases underlying the principles of feeding. Practice work is given in compounding rations and estimating the comparative value of foods stuffs.

Commencing the first Tuesday in February, lectures in bacteriology are given the girls in place of dairy feeding. This work treats in an elementary way the subjects of bacteria, yeasts, and molds in the home. It is the purpose of this course to familiarize the young women with the growth and character of fungi commonly met in household and dairy management. A microscopic examination and study of the more common forms of fungi is made and special stress is laid on the practicel application of the subject to the home.

Dairy practice.—Students receive instruction in the most advanced methods of creaming milk, ripening cream, churning, working and packing butter, the manufacture of sweet curd cheese, and measuring the value of milk by the Babcock test and lactometer. This practice work begins the third week of the first term and continues through the school year.

DOMESTIC CHEMISTRY

The composition of human foods and their combinations to form balanced rations, dietary studies of families, cost and value of foods, chemical changes and losses in the cooking and preparation of foods, cereal food products, animal food products, fruits, adulterations of foods and their detection, fuels, soaps, disinfectants, dye stuffs and colors, composition of common household utensils the household water supply, preparation of home-made baking powders, bakers' chemicals, the composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar, spices, flavors, extracts, etc., the grading and testing of wheat flour, the chemistry of bread making and household sanitation, form the essential parts of this work.

Laboratory practice is given in study of the composition and detecting adulteration of different foods, such as milk, cream, butter, oleomargarine, lard, cheese, coffee, tea, vinegar, catsups, jellies, flavors and extracts, baking powders, cereal breakfast foods, and flour. The aim of this work is to give students an idea of composition, uses and value of food materials, and the part chemistry takes in sanitation and household affairs.

DOMESTIC HYGIENE

Several lectures by a physician will be given upon maidenhood maternity and infancy. These special lectures will be supplemented by the regular lectures which consider the health of the family as dependent upon pure food, pure water personal cleanliness, and proper habits, as well as upon heredity. The aim is to impress the truth that a knowledge of and obedience to the laws of hygiene are essential to the preservation as well as the restroation of health.

DRAWING

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application.

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs, students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

DRESSING AND CURING MEATS

The instruction given the boys consists of demonstration lectures on the preparation of meat for farm use. They are required in addition to take two weeks' practice in dressing, cutting, and curing such meat as is likely to be used on the farm Work is also given them in selecting and judging fat stock and in judging dressed meats.

ENGLISH

Applicants for admission to the school who are deficient in the knowledge of the inflections of the parts of speech, the classification of phrases and clauses, and case constructions, are required to make up the deficiency by a course in grammar for which no school credit will be given.

"C" Class. In the first year, English is studied five hours a week for one term. Three hours are given to constructive work with almost daily practice in writing short exercises based on Mayne's "Modern Businss English." Two hours are given to the interpretation and analysis of literature.

"B" Class. In the second year, English is studied two hours a week for two terms. The writing of weekly themes and the study of the forms of discourse constitute the work.

Intermediate English is required of those who intend to enter any of the colleges. It consists of a study of masterpieces necessary for college entrance, the history of English literature, and considerable writing on subjects in connection. It is given five hours a week for two terms.

"A" Class. In the thrid year an optional course in rhetoric is offered in the second term for four hours a week. The object of the training is fluency and correctness in written and oral English.

ENTOMOLOGY AND ZOOLOGY

The class in entomology receives instruction of a practical nature. The course is divided as follows:

Classification of insects, habits and life histories of injurous forms with special attention to insect pests found in Minnesota. The nature of the idfferent insecticides and methods of application are discussed. The student spends some time in becoming acquainted with the appearance and habits of benefilcal insects. Each student must collect fifty insects representing at least twenty-five different kinds.

The four-footed pests of the farm—rabbits gophers, squirrels, etc., as well as injurous and beneficial birds, arealso studied.

FARM ACCOUNTS

The workin accounts is applied to the transactions which the student meets in the various duties of the farm. He is taught to keep his accounts, that he may know at any time the profit or loss of any department of his business, and is thus enabled to plan intelligently.

FARM ARITHMETIC

Instruction in this subject consists of the application of its principles to all kinds of farm problems where measurements of material, extension, capacity, etc., are required. The student is prepared also to handle with ease the mathematics of the technical courses in the school.

FEEDING

The princpiles of feeding as applied to the production of horses, beef cattle, sheep and swine are taught. Special attention is given to the choice and preparation of food for animals during different periods of growth and during the time they are used for breeding purposes, and to summer feeding and pasturage. Practice is given in compounding rations that will include in the best manner the food stuffs commonly produced on the farm. Practical lessons in feeding are given at the barns under the supervision of an experienced feeder. Each student thus learns the requirements of each class of stock.

FIELD AGRICULTURE

This work consists of a study of those portions of geology relating to soil formation; effect of the glaciers on the soils of Minnesota; origin of soils in the various agricultural regions of Minnesota; classification of soils; soil moisture and soil tillage; land areas and the planning of fields and farms; the classes of field crops as grain grass, and cultiveated crops; the relation of these crops to each other in a systematic rotation and in their relation to soil fertility; the origin, distribution, and uses of cereal crops and other field crops.

FIELD CROPS

Students are admitted to this subject after having finished the work of agriculture and receive instruction as follows'

Crop rotations, farm management, and planning farms under various conditions; production and care of farm manures and green manure crops; fertilitv as related to weeds, crop production and profits; preparation of land; planting, cultivating, harvesting, storing, and marketing of grains, roots, fiber, sugar, grass, and other forage crops; meadows and pastures; treatment of field crop diseases; selecting, breeding, and judging seed.

FORESTRY

Forestry includes the consideration of the formation and care of wind breaks and shelter belts; the laying out and planting of home grounds; discussion of the hardiness, habits, and value of our native and introduced trees, and the methods of propagating them.

FRUIT GROWING

Fruit growing is taught with reference to raising fruit for market and in the home garden.

GYMNASIUM WORK

The gymnasium is a large, well lghted, two story brick building. It is well supplied with heavy apparatus for general gymnastic and athletic exercises, together with such appliances as are necessary for the development of a symmetrical body. Besides being fitted up with the finest apparatus, it possesses space and equipment for sprinting, pole vaulting, hurdling high and broad jumping, shot putting, etc.

Class work in physical training is required of all undergraduate young men not excused on account of physical disability. Courses are offered on the heavy apparatus, in corrective work, class drills, and athletic training. In addition to the regular class drill, a certain part of which consists of training in athletic sports, the school is represented by a strong basket ball team, a track athletic team, hand ball team, and an indoor tennis team.

HANDLING GRAINS AND MACHINERY

Practical suggestions for the best metohds of harvesting, shocking, stacking and storing cereal grains; adaptationof the various kinds of machinery with reference to the soil, weeds and seasons; adjustment with special reference to durability, convenience in manipulation, etc., are given.

HOME ECONOMY

The lectures in home economy are a study not only of the just proportion between expenditure and income, but of defininte proportion in the expenditures made for existence, comfort, culture, and philanthrophy. A study is made of the sources of income, especially of the income from the farm in the form of house, food, and luxuries; the purchase of necessities such as household stores and furnishings is considered from tue standpoint of the suitable, and desirability shown of saving something to be used in securing things, which promote culture and comfort. The relation of cash and credit to cost is also considered. Attention is given to saving and forms of investment, a book account, and the use of a check book. Students are required to submit an account setting forth in detail the use of a certain named income expended in the support of a family for one year, embracing not only every item of necessary home expense, but also an outlay made for travel, luxuries, accident, sickness, or other emergencies. The habit of keeping a household account is calculated to strengthen the judgment in the wise use of money.

HOME MANAGEMENT

This subject includes both housekeeping and home-making, and the instrution is based on the belief that housekeeping is a business as important as it is difficult and that home-making is the nobliest form of human endeavor. The care of the house and household belongings, of the food, utensils, plumbing, etc., as well as the general ordering of family life, are considered in their relation to an adequate plan for home management. To start the student in the right way of becoming mistress of the business of housekeeping and home-making is the end sought. The practical benefit to be derived from the knowledge students gain in the cookery, sewing, dairy, laundry, and other classes, is emphasized and shown in its relation to an adequate plan for the daily program for the home.

HOUSEHOLD ART

Lectures are given upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house, also the influence of the outlook; an elementary study of architecture in connection with planning a house which will provide "a place for everything" required in housekeeping oyerations and family life; instruction in the fundamental value of color, form, and design' training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishings and furnishings of the house.

LAUNDERING

Second term, C. year: The aim is to give the students a knowledge of the best means of cleansing all fabrics with little injury to the cloth or color. Approved methods of cleasing by the use of chemicals, as removing grease spots, stains, etc., are given.

LITERARY SOCIETY WORK

Any student belonging to a recognized literary cociety of the school may receive credit in the course of study for the work done therein by registering at the beginning of the term, and submitting to the teacher in English all essays to be read by such student before the literary society and rehearsing to said insructor all essays readings, or recitations with a view to correct pronunciation, expression, etc.

MEATS

The instruction given to the girls in the subject of meats pertains to the selection and value of different classes of meat, and to the best methods of curing and preserving.

MILITARY DRILL

Under the provisions of the Act of Congress of 1862, establishing the "Land Grant Colleges" of the United States, instruction in Military Science and Tactics is required to be given at all colleges which are its beneficiaries. For this purpose the United States Goernment furnishes the Department of Agriculture with the necessary arms and equipments, and details an officer of the regular army to take charge of military science and tactics.

All male students of classes B. and C. not physically unfit are required to attend military drill. For the A. Class, drill is an elective.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor, and obedience to lawful authority, as well as to familiarize students with battalion manoeuvres, guards, and the theoretical and practical use of firearms.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment, and able to pass a creditable examination in drill regulations.

In general, the officers are selected from the "A" class; sergeants and corporals from the "B" class.

MUSIC

Instruction in this department takes an elementary theory, sight singing and music history. The course is planned to give the students a basis for musical appreciation and culture, as well as a practical knowledge of musical forms and terms Special attention is given to habits of breath control and enunciation of words, and a thorough system of solfeggio is employed.

For students whose voices and training will admit them, there is offered a chorus class, consisting of a mixed chorus, a women's chorus, and a male chorus. This offers special advantages for musical development and experience.

A student orchestra is maintained which assists in public exercises given by the school.

PHYSICAL TRAINING

The work done in this department aims at symmetry, co-ordination, and control rather than mere physical strength. It is planned to improve the functional activity of the body and to counteract and correct tendencies toward incorrect development, especially those resulting from the artificial life of civilization. The work of the beginning class is free hand, based upon Swedish principles, and directed especially to deep breathing, correct carriage and posture. The work of the advanced class includes light apparatus and aesthetic movements for grace and suppleness in action. Vigorous games are given to both classes.

PLANT PROPAGATION

In this subject the principles underlying the development of cultivated varieties of plants and seed testing are taught; also the propagation of plants by seed, cuttings, grafting, and budding. The work of the class room is illutrated by the orchards, nurseries, forest plantations, gardens, and greenhouses on the grounds of the experiment station, and by visists to commercial nursieries and greenhouses near by.

POULTRY

The instruction in this subject will include the following topics: History and characteristics in the leading breeds of poultry; breeding, rearing, and management of fowls for eggs and for the market; planning building, and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator-cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

PRACTICUMS

During the first year the young men spend four hours each week in a series of lessons and exercises in the barns and fields, taking up such practical lines of work as land surveying, laying tile drains, building fence, setting up farm machinery, soldering, pipe-fitting, splicing rope, making rope halters, cement work, etc.

SEWING

Instruction is given in the principles and use of healthful and appropriate clothing and in the needlework of the home. The course provides for five term's work. During the first term instruction is given in the elements of sewing, including different stitches, seams, hems, and the various kinds of mending; also practical talks on the use and care of the sewing basket, touching the history of the various implements used, and upon the textiles used—cotton, wool, linen, and silk.

In the second year instruction is given in cutting and making plain garments, drafting underwear, shirt waists, and cotton dresses—taught by a simple method in which only a tape line and square are used.

In the third year the more difficult work of dressmaking is taken up, pattern drafting, designing, cutting and fitting dresses. A practical aid to the work in this subject is offered by a museum of exhibits. These exhibits are kept in the class rooms and include primitive and modern sewing implements, weaving pocesses and the various cloth fibers.

Lectures are given on the utilitarian and art values of various textiles, and attention is paid to harmony in color.

SOCIAL CULTURE

A course of lectures is given on the usages of society, including manners, behavior, the voice, conversation, forms of address, invitations, etc. Suggestions are made in reference to reading, literary taste and the choice of books. Special stress is given to the thought that the family life ought to be the highest expression of good society, and that next to the power of thinking correctly is the power of approaching others with ease and speaking with tactful directness.

SOILS AND FERTILIZERS

Some of the topics studied are: The formation of soils, adaptability of crops to different kinds of soils, chemical composition of soils, physical analysis of soils, interpretation of soil analysis, the judging, rating, and scaling of soils, alkali soils, acid soils, humus and its relations to soil fertility, the factors governing the increase and decrease of the nitrogen of the soil, farm manures—their composition and uses, and their action upon soils—green manures, commercial fertilizers, special purpose fertilizers and their use; the influence of different methods of cultivation upon the fertility of the soil, the food requirements of farm crops, the rotation of crops as effecting the fertility of the soil, the income and outgo of fertility from farms where different systems of farming are followed, the general principles of soil exhaustion and soil improvement and the various factors which affect the fertility of soils. The class room work is supplemented by laboratory practice.

STOCK JUDGING

Score cards are used to an extent sufficient to familiarize students with that method of judging, and special efforts are made to do systematic and closely critical work in the selection of animals representative of the breeds and for breeding purposes. Living specimens are used and rings made up for the student contests in stock judging. In connection with the work in dressing and curing meats, the judgment passed on live animals for the block is verified by score cards, judgment of the dressed carcasses, and by actual block tests. These tests are made by the students and bring out the percentage of meat in each commercial cut of the carcass. The quality of meat is passed upon in this connection by experts, and a careful report made to ascertain the type of animals best calculated for the production of the most meat of the best quality.

STUDY OF BREEDS

The market classes of horses, cattle, sheep, and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with the most common and valuable breeds for the state. These are studied carefully as regards their characteristics and origination, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at University Farm for this purpose.

VEGETABLE GARDENING

Vegetable gardening embraces the study of garden tillage, irrigation, and rotation of crops; transplanting; formation and care of hotbeds; study of garden insects; and the growth of various vegetable crops.

VETERINARY SCIENCE

During the A year the student takes up a course of study in veterinary medicine, the purpose of which is to fit him for intellignet care of his farm stock. In this course the teaching is done by means of lectures and reviews and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of stereopticon charts, manikin of horse, skeleton of horse, and various other appliances.

The work covers the following subjects: Elementary anatomy; elementary pathology; cause and prevention of diseases; diagnosis and treatment of common diseases; examination for soundness; and a final short course on common medicines, studying their effect, uses and doses. At the hospital clinics, students are enabled to examine and care for a variety of cases and to learn the elements of diagnosis for the more common diseases and forms of lameness.

STUDENTS' TRUST FUND

The class of 1902 left with the school a fund of $100 "to assist by temporary loans at a reasonable rate of interest, deserving students needing such help, who are not below the B class in the school of agriculture." This fund is in charge of a committee consisting of the secretary, the principal, the preceptress, and the president of the A class.

THE LUDDEN TRUST

The Honorable John D. Ludden, of St. Paul, gave the University of Minnesota, $5,000 to be held, invested and re-invested by the University, through its Board of Regents, and the income thereof to be collected, received and applied by said Board of Regents to the financial assistance of students of either sex in the School of Agriculture. Mr. Ludden delivered into the hands of the regents for the principal sum one Northern Pacific registered prior lien railway land grant gold bond of the denomination of $5,000, payable to the University of Minnesota,and its assigns in gold coin, on the first day of January 1997, with interest at 4 per cent per annum, payable quarter-yearly in like gold coin, the fund to remain so invested until the bond matures, unless by reason of changed conditions a re-investment shall be sooner deemed judicious by the Board of Regents for the safety, conservation, or continued productiveness of the fund. The premium on the purchase of this first grade security was $212.50,and was paid by Mr. Ludden, thus enlarging his donation by that amount.

Mr. Ludden imposes the following conditions: "The beneficiaries must be youths who are residents of the state of Minnesota; they must be and continue of unblemished moral character, and of temperate and industrious habits, and they must be such as by examination and trial shall evince and maintain a taste, habit and aptitude for study and improvement; and any student who shall fail to come, or shall cease to be, within the above conditions shall forfeit all claims to the benefit of such fund. Subject to these conditions the administration of such income is entrusted to the said board of regents, which may make such rules therefor as they may deem judicious."

This fund produces $200 a year. Those wishing to avail themselves of its benefits should apply to the executive committee of the Board of Regents of the University of Minnesota.

Mr. Ludden has since donated another $5,000 for a like purpose so that the yearly income is now $400.

Intermediate Year

For Graduates of the School of Agriculture who wish to enter the College of Agriculture

The course of study in the School of Agriculture extends over three years, and the school year is six months long. This does not give sufficient time for prepaartion for college work, and it has been found necessary to supplement the course offered in the School of Agriculture by an additional year's work in general academic branches. The subjects offered in the intermediate year can be taken elsewhere in any accredited high school before entering the School of Agriculture. This intermediate year enables graduates of the School of Agriculture to enter the College of Agriculture on the same basis of preparation as students enter other departments of the University. English and mathematics are given prominence in the intermediate year.

The following prescribed course, or its equivalent taken in some other school is required of graduates of the School of Agriculture, who desire to gain admission to the College of Agriculture.:

FIRST SEMESTER	SECOND SEMESTER
Elementary algebra [5]	Higher algebra [5]
Plane geometry [5]	Plane geometry [5]
English [5]	English[5]
General history [4]	General history [4]

The course in algebra for the intermediate year covers Downey's Complete Higher Algebra through logarithms except chapter 14 part I, and chapter 18 and parts of 19 and 20 Part II, covering subjects not specially pertinent to the work of this college. The course in Plane geometry covers Gore's geometry from book I to V or equivalent texts.

Special attention is given in both above courses to practical problems, short methods of computation and a good foundation for plane trigonometry. These courses are open to all who have completed the work in algebra in the third year of the School of Agriculture and are required of all students entering college courses, except that the 2nd term algebra is not required for the course in Home Economics. Regular high school graduates will be required to take the work of the second semester in higher algebra unless they can furnish regular high school record in same.

The work preliminary to these courses is done by the student in the A year in the School of Agriculture.

The course in English extends through both terms. Two periods a week are devoted to composition, with Scott & Denny's Composition. Rhetoric as a text-book, and three to the study of literature, which will also be made the basis of considerable written work. The characteristic works of the following authors will be studied: Shakespeare, Bacon, Milton, Addison, Gray, Goldsmith, Burns, Wordsworth, Lamb, Macaulay, Ruskin, Browning and Tennyson. Individual members will be assigned readings from various other authors.

CROOKSTON SCHOOL OF AGRICULTURE

The Crookston School of Agriculture, Crookston, Minn., established by the legislature of 1905, is in active operation and offers to the young men and young women of the Red River Valley a three years' course in practical farming and home-making. The school year for 1909–10 will open October 5, 1909 and close March 52, 1910. For further information address Crookston School of Agriculture, Crookston, Minn.

THE MINNESOTA FARM REVIEW

The Minnesota Farm Review is a monthly agriculutural paper owned and published by the Alumini Association of the School of Agriculture. The paper is intended to be a medium by which the former students of this institution shall be kept in touch with each other and also with the School and Experimental Station. It also endeavors to bring the farmers throughout the state generally, into closer connection with the institution and to this end strives to present the latest progress in experimental work at the various Stations. It is the official organ of the Alumni Association and of the Farmers' Club.

THE FARMERS' CLUB

The Farmers' Club of Minnesota is an organization composed of students and ex-students and members of the faculty of the School of Agriculture. Any one who has ever registered as a student in the regular, dairy, or short course or who is or has been a teacher in the School of Agriculture, is eligible to membership. The objects of the club are to foster and strengthen the ties between the School and its former students and to extend the work of the School and Expermient Station among the farmers of the state. To this end the members of the State Club have formed County Clubs which hold annual meetings for the benefit of the farmers of the community. To quote from the annual address of its president: "The School of Agriculture is an institution of the farmers, for the farmers, and supported in a large measure by them, and each student of the School should use his knowledge to better the conditions about him. The State has invested from one to several hundred dollars ni his education and expects to realize on that investment by the knowledge which he will distribute."

Dairy School

FACULTY

Cyrus Northrop, LL.D., President.
J. W. **Olsen**, B.S., Dean.
T. L. **Haecker**, Dairy Husbandry and Animal Nutrition.
E. K. **Slater**, Dairy Husbandry.
J. A. **Vye**, Creamery Records and Accounts.
Harry Snyder, B.S., Dairy Chemistry.
M. H. **Reynolds**, M.D., D.V.M., Diseases of the Dairy Cow.
J. M. **Drew**, Forage, Farm Buildings.
Wm. Boss, Practical Engineering.
H. L. **Russell**, Ph.D., Dairy Bacteriololgy.
Elov Ericsson, Cultures and Starters.
I. O. **Dybevick**, Butter-making.
P. M. **Mortesen**, Cultures and Starters.
Geo P. **Grout**, Dairy Laboratory.
H. T. **Sondergaard**, Judge of Dairy Products.
A. G. **Schandell**, Assistant in Cultures and Starters.

The next session of the Dairy School will open Monday, November 15th, 1909, and continue four weeks.

This course is designed to furnish persons who are actually engaged in the manufacture of butter and cheese in creameries and cheese factories an opportunity to become more skilled in their work and also to study the many problems which have a direct bearing upon the dairy industry. Recoginzing the fact that such persons cannot be away from business for a long period, the term has been so arranged that the time of each student is fully occupied by lectures and actual work in the creamery training room every hour of every working day of the term.

The rapid growth of the dairy industry in the Northwest calls for constant enlargement in equipments for dairy hall.

With each succeeding year, as dairy products manufactured in our creameries take higher rank in quality and finish, the character of the instruction given must be of high order. To meet these requirements the training rooms are each year equipped with the best apparatus, and the corps of instructor3 is composed of the most skillful workmen and best instructors.

No pains will be spared to maintain the high standard which the school has attained. Each member of the faculty has special qualifications for the duties to which he has been assigned. The lecture course and practical instruction are arranged with special reference to giving the greatest amount of training and practice possible in a four weeks' session.

Instruction is divided into seven courses:

1st. Lectures covering the entire field of dairy husbandry.

2nd. Practical work daily in the butter room.

3rd. Practical work daily in the cheese room, where the manufacture of flats, cheddars, Swiss, brick, Edam and Gouda cheese is carried on.

4th. Practice work in the laboratory, examining milk, making daily composite tests, and the pasteurization of milk and cream.

5th. Practical engineering, steam fitting and plumbing.

6th. Practical work in factory bookkeeping.

7th. Practical work with cultures and starters.

LECTURES

The course in sixty lectures furnishes in a plain and concise form the most valuable information for those who are interested in any branch of agriculture, covering, as it does, the most important points in the breeding, rearing, feeding, and general management of dairy stock, the economical production of milk, growing and preserving of forage and grain crops, the management of meadows and pastures, management of barns, stables, and yards, construcion of silos, co-operative dairying, creamery and cheese factory management, judging and marketing dairy products, the chemistry of milk, dairy bacteriology, engineering, animal hyginene, and treatment of the common diseases of the dairy cow.

BUTTER MAKING

The running of separators, ripning and churning cream, how to ripen cream to secure best flavor, how to churn, wash, and salt butter so as to avoid specks and mottles, to secure good grain and best methods of preparing for market are some of the points which receive special attention. As all creamery men should be able to judge butter from a commercial standpoint, students are trained daily in the art of scoring butter by the score card.

CHEESE MAKING

The work in the cheese room is conducted on a large scale, including the manufacture of several brands of fancy cheese, The fact that there is a demand for these at highly remunerative prices has induced the Regents to provide the necessary means for carrying on this work.

A complete record of every step taken is required of each student. Here is a good opportunity for cheese makers to meet. investigate new methods, make experiments on doubtful points, compare notes, and thus gather, in a few weeks, knowledge that otherwise would take years to acquire.

MILK TESTING

It has been found that the value of milk for both butter and cheese is measured by the per cent of fat content, and nearly all our factories and creameries now base the payment for milk on the fat content. It is therefore necessary for every factoryman to familiarize himself with the best methods of milk testing. The chemist gives a general outline of the work, but in order that each student may have thorough training in milk testing, daily exercise is given. Steam turbine and hand power machines and other apparatus are provided and operated in the laboratory.

The pure and wholesome milk and cream supply for our cities is a matter of vital importance, and there is great need for improved methods of handling milk intended for this purpose. To meet this, milk and cream pasteurizing apparatus of the latest and most improved makes has been provided for the dairy school, and a few advanced students will be given instruction in this work.

MOTIVE POWER

The work in engineering consists of practical talks on the construction, care, and management of creamery engines and boilers, pumps, injectors, heaters, etc., and work in the practice room.

In the practice room are provided an eight horse power, simple, slide-valve engine, three types of boiler feed pumps, two types of deep well pumps, one injector, two milk pumps and a steam gauge, which the students have the privilege of examining and operating. Instruction is also given in pipe fitting, placing shafting, babbiting bearings, soldering, etc.

It is the aim to make this work as practicable as possible. Questions of interest on the subject are freely discussed.

FACTORY BOOKKEEPING

All the essential features of creamery accounting from the receipt of the milk to the returns in net proceeds are thoroughly considered. Paying for the milk according to the fat content, or otherwise, is fully explained. The students do the actual one month's accounting of a creamery in books provided.

STARTERS AND CULTURES

Since all students who are admitted to the school have had some exeperience in the routine work of running separators and since the most important part in butter making is the art of uniformly making a product having a fine flavor and good keeping qualities, special attention is given to cultures, starters, and pasteurization. Constant additions will be made to the equipment needed to make this course inviting to those who wish to fit themselves for masters of the art of creamery butter making.

REQUIREMENTS FOR ADMISSION

Experience has shown that students who have had some practical training in the creamery or cheese factory before coming to the dairy school are, as a rule, the ones who are able to make the most of the course; it is therefore required that persons who intend to take this course shall have had at least one season's experience before coming to the school. No entrance examination is required.

EXPENSE

A registration fee of $15 is required of each student. Students can board in either city and reach the school by street car, or board can be secured near the school for from $3.50 to $4.00 per week. Each student is required to supply himself with two white suits, including caps, to be worn during working hours in the creamery and cheese rooms. The suits may be procured for about $1 each.

DAIRY CERTIFICATES

The Regents will grant dairy certificates to students who have taken the course and passed a satisfactory examination and in addition have demonstrated by at least one year's work in a factory that they have acquired special skill in the art of butter and cheese making, and are thoroughly qualified to take charge of a creamery or cheee factory.

To reach the school from either St. Paul or Minneapolis, take the Como-Hopkins of Como-Harriet street car and get off at Commonwealth avenue.

Address applications for admission to T. L. Haecher, University Farm, St. Paul. Minn.

Short Course for Farmers

FACULTY

Cyrus Northrop, LL.D., President.
J. W. Olsen, B.S., Dean.
Samuel B. Green, B.S., Horticulture, Forestry.
J. A. Vye, Business Methods.
Harry Synder, B.S., Agricultural Chemistry, Soils.
T. L. Haecker, Dairy Husbandry and Animal Nutrition.
M. H. Reynolds, M.D., V.M., Veterinary Science.
J. M. Drew, Poultry, Workshop Hints.
A. Boss, Live Stock, Dressing and Curing Meats.
Wm. Boss, Farm Mechanics.
F. L. Washburn, M.A., Insect Enemies.
E. M. Freeman, Ph.D., Plant Diseases.
Coates P. Bull, B.Agr., Farm Implements, Grains.
W. L. Oswald, Farm Botany.
D. D. Mayne, Parlimentary Practice.
A. L. Ewing, M.S., Farm Physics.
Juniata L. Sheppard, Domesic Science.
Margaret Blair, Domestic Arts.
J. T. Stewart, B.S., Farm Drainage.
Geo. P. Grout, B.S., in Agri., Dairy Stock.

This course of instruction is provided by the Faculty of the School and College of Agriculture to meet the needs of men and women of mature years who are actively interested in the work of the farm.

The next term will be open on Friday, Jan. 14th, and will continue for four weeks, closing on Friday Feb. 11th, 1910.

This is a lecture course, covering the more important branches of agriculture, horticulture, live stock, farm botany, farm chemistry, entomology, poultry, dairying, etc. Special instruction will be given in the judging of grains, soils, and animals.

The daily program will be so arranged as to allow the ladies to take the lectures in entomology, botany, horticulture, poultry, and other subjects of the short course in which they would be interested in common with the men.

Work will begin at 8:15 o'clock a. m. and close at 3:40 p. m. During the course there will be no work on Monday, but this day will be spent in visiting places of interest such as the stock yards, stock farms, flour and flax mills, etc.

For the entire course, or any part thereof, registration fee of $5.00 will be charged.

Those taking this course should register and secure boarding places not later than Thursday, January 13th, as work will begin promptly at 8:15 on Friday, January 14th.

Board may be secured in either of the Twin Cities at $3.50 to $4.50 per week.

Farmers wishing to register for the course, or desiring further information, should write to D. D. Mayne, Principal, or Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.

AGRICULTURAL CHEMISTRY

The chemistry of plant growth and the chemical principles involved in farm life, and their application to the production of crops, form the basis of this work.

AGRICULTURE

The selection of farms and soils suitable for specific crop production; planning farms; developing the fields, drainage, roads, fences; developing the farmstead and its buildings; managing fields and growing, cultivating, harvesting and preserving forage and grain crops; the rotation of grain, cultivated and grass crops; the use of live stock; and general farm management.

ANIMAL HUSBANDRY

A series of lectures will be given on animal breeding. These lectures will include the known laws of breeding, such as heredity, variation and atavism. Attention will be given to such features as the selection of prepotent sires and dams, to cross-breeding, in-breeding, and other matters of interest to the breeder of live stock. Pedigrees will be discussed and the students made familiar with the registration and transfer of pure bred stock. The feeding and management of horses, beef cattle, sheep and swine will also be discussed. Foods suitable to each class of animals, and methods of preparing and feeding them will be among the subjects receiving attention, together with directions for the practical management of stock while in the stable and pasture.

DAIRY HUSBANDRY

The lectures in dairy husbandry will cover the characteristics of the various breeds of dairy cattle, their comparative adaptability for the various phases of dairying and the style or type of cow that has demonstrated her ability as a large and economical producer. The scientific and practical phases of feeding for milk production will be explained, and practical instruction and training given in calculating rations for milk production.

DAIRY STOCK JUDGING

The instruction given in judging dairy stock will be based upon the actual performance of animals bred and reared in the dairy division, the records covering a period of five years and giving the annual yield of milk and butter fat, cost of production and profits.

DRESSING AND CURING MEATS

The work in dressing and curing meats will be given in a course of demonstration lectures. In demonstrating these lectures the animals will be dressed before the class and the reason for each operation fully explained. The methods of cutting up the dressed carcass for different purposes will also be shown before the class and the use and value of each cut explained. Sausage making, lard rendering, and the "working-up" of all parts of the animals will be taught in a simple and direct way.

ECONOMIC ENTOMOLOGY

The entomologist will give a course of lectures on injurious and beneficial insects, and will discuss the various insecticides and methods of application. The four-footed pests of the farm—rabbits, gophers, etc., are also studied, and a few lectures are given on practical bee-keeping. If there be sufficient demand to warrant, and time permits, a few lectures will be given on birds and their relation to agriculture.

FARM ACCOUNTS

A series of lectures will be given on business forms, business arithmetic and the keeping of simple farm accounts and records.

FARM BOTANY

Eight lectures will be given on the phases of botany of special interest to farmers. For example, the pollination of flowers, weeds and weeds seeds, poisonous plants, fungus diseases of plants and how to deal with them will be considered.

FARM HORTICULTURE

Lectures will be given on the care and management of the apple and plum in this climate, including such subjects as location of the orchard, selection of the trees, planting, cultivation, green manuring; preparation for winter; advantages and disadvantages of root grafting, budding and top working; diseases injurious to orchards. Lectures on the care and management of small fruits will consider the subjects of selection of varieties, planting and cultivation, origin of new varieties, propagation, marketing, winter protection, also the insects and diseases injurious to raspberries, blackberries, currants, gooseberries, strawberries and grapes. Under vegetable gardening will be considered the growing of potatoes, tomatoes, celery, onions, squash and cucumbers.

FARM IMPLEMENTS

The lectures on farm implements will be illustrated, as far as possible, by samples. Stereopticon views will be made use of in illustrating machines that cannot well be taken to the class room. It is the aim in these lectures to bring out the lines covering the draft of implements and the objects attained by their use. Suggestions will be made on selection of implements adapted to various kinds of work. The care of implements when not in use will also be discussed, and an attempt made to give as fully as possible all information that will be beneficial in the care and handling of farm machinery.

FARM MECHANICS

The instruction given in this subject will consist of lectures on farm mechanics, taking up such subjects as pumps, farm water systems, windmills, the general principles of steam and gasoline engines, placing shafting, pulleys and belts, pipe fitting, soldering, etc. Some instruction will also be given in sharpening and using hand tools, such as saws, planes, chisels and other tools necessary in farm practice.

PHYSICS AND FARM DRAINAGE

This course consists of six lectures with illustrative experiments. In these exercises the following topics are discussed: The principles of draft in the horse; the causes of draft in wagons, including the effect of road-bed; the effect of grades or hills, involving the principle of the inclined plane; the various questions involved in eveners, road construction and maintenance; including the question of reducing grades, the power at which a horse works to secure the necessary change in the soil to produce the highest degree of plowing, hauling, etc.; horse power; weather forecasting.

POULTRY

Lectures will be given on this subject with special reference to the needs of the Minnesota farmer. The following subjects will be considered Location and construction of poultry buildings and yards; a study of the breeds best adapted to the farmer's use; the hatching, rearing and management of the farmer's stock; feeding for eggs and for fattening; killing and dressing fowls, and packing for market; marketing eggs.

SOILS

Lectures are given on the conservation of the fertility of the soil, the composition and use of farm and commercial manures, the draft of different farm crops upon the soil and the methods of making the fertility of the soil available by the rotation of crops and other means so as to secure the necessary changes in the soil to produce the highest degree of fertility. The judging of soils is made a feature of this work and includes the testing of soils and the determination of the type to which a soil belongs, the methods of cultivation and the crops most suitable to grow upon the soil.

VETERINARY SCIENCE

This work includes a series of lectures on elementary anatomy, animal foods and digestion; and causes, prevention and treatment of common diseases of farm stock. An especial effort is made to have this work practical and helpful to men who are actually handling farm stock.

WORKSHOP HINTS

In addition to the above, four lecture periods will be devoted to farm workshop hints, such as splicing rope, making rope halters and rope belting, and tempering simple tools.

Short Course for Teachers

FACULTY

CYRUS NORTHROP, LL.D., President.
C. G. SCHULZ, State Superintendent of Public Instruction.
JOHN W. OLSEN, Dean.
D. D. MAYNE, Principal.
SAMUEL B. GREEN, B.S., Horticulture, Forestry.
HARRY SNYDER, B.S., Agricultural Chemistry, Soils.
T. L. HAECKER, Dairy Husbandry, Animal Nutrition.
M. H. REYNOLDS, M.D., V.M., Veterinary Science.
ANDERW BOSS, Agriculture, Animal Husbandry.
FREDERICK L. WASHBURN, M.A., Entomology.
E. M. FREEMAN, Ph.D., Plant Pathology.
WILLIAM BOSS, Farm Mechanics.
J. A. VYE, Secretary and Treasurer, Accounts.
J. M. DREW, Registrar, Blacksmithing, Poultry.
FANNIE C. BOUTELLE, Domestic Economy.
JUNIATA L. SHEPPERD, M.A., Domestic Science.
MARGARET BLAIR, Domestic Art.
JOHN A. HUMMEL, B. Agr., Assistant in Agricultural Chemistry.
COATES P. BULL, B. Agr., Assistant in Agriculture.
LEROY CADY, B.S., in Agr., Assistant in Horticulture.
D. A. GAUMNITZ, M. Agr., Assistant in Animal Husbandry.
A. D. WILSON, B. S. in Agr., Assistant in Agriculture.
A. G. RUGGLES, M.A., Assistant in Entomology.
T. P. COOPER, B.S., in Agr., Assistant in Agriculture.
J. P. WENTLING, M.A., Assistant in Forestry.
A. D. WILHOIT, M.A., Assistant in Soils.
A. R. KOHLER, B.S.A., Assistant in Vegetable Gardening.

PURPOSE OF THE SCHOOL

The short summer course for teachers, principals, and superintendents, has been etablished to meet the demand for agricultural instruction by educators who wish to teach the elements of agriculture, or who wish to be able to supervise the teaching of the subjects intelligently in the pulbic schools. It is intended to be especially helpful to teachers who desire to be more efficient in teaching the elements of agriculture in rural schools, or in small village schools having an attendance largely from the country.

High school teachers who wish to get more complete information on agriculturel subjects and technical work so as to make more practical their teaching of botany, physics, chemistry, and other natural sciences, may find here the opportunity they have long been seeking.

Principals of high schools who wish to introduce carpentry, blacksmithing, the elements of agriculture, sewing, cooking, may here get such an insight into the subjects that they may go about their introduction and supervision with some degree of confidence.

County superintendents having to do with country conditions more than others should seek to become familiar with modern agricultural problems and their solution. It is hoped that this short course may appeal to all the special classes mentioned as well as to some who are interested merely in the form of industrial education presented as a means of general information and culture.

LOCATION

The school is located at the University Farm, midway between Minneapolis and St. Paul. It is about a 15-minute walk from the street car line. To reach the school from either city, take a Como-Harriet or Como-Hopkins car, and get off at Commonwealth Avenue.

Although the school is located in the country, and has all the advantages of the quiet and fresh air of the country, yet it is close enough to the Twin Cities to get all the benefits of these large centers. No more beautiful spot between the two cities could have been selected for such a school. Situated on picturesque hills, overlooking the midway and the two cities, the buildings are grouped conveniently about the undulating campus. Nature has done much to make this a beauty spot and the landscape artist has added to the beauty in the arrangement of paths and the replacing of trees and shrubs with many varieties suited to the climate.

PLAN OF THE COURSE

This course is complete in itself, covering three weeks of lectures and laboratory work, commencing Monday, June 21st, and closing Saturday, July 10th, 1909.

It is expected that those who register for the course will take the work as outlined, the topics under consideration have been chosen with great care with reference to a useful and logical arrangement. The morning sessions are planned to interest the entire class in one body, while the afternoon periods offer an optional course. Those desiring to specialize in domestic science and art find that work offered, while the men are occupied in blacksmith and carpentry shop work.

EXPENSE

The registration fee for the entire course or for any part of it, is $3.00.

Good board will be furnished at the large dining hall for $3.50 per week. Dormitory rooms may be used free of charge. These rooms have all necessary furniture, except pillows, pillow cases, sheets, quilts and towels. Those expecting to occupy the dormitories should bring such articles with them. If desired, the articles named may be rented at the school for 60 cts. per week. It will aid greatly in making arrangements for the proper accommodations, if those who expect to attend will write of their intention before June 1st.

Any one desiring further information in regard to this course may apply to Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.

THE CONFERENCE HOUR

A conference hour is arranged for each day before dinner. At this time subjects of special interest to school men and women will be considered. Round table discussions of pedagogical problems especially related to the introduction of vocational subjects into the public school curriculum will be held.

Short talks and lectures by men prominent in educational work will be given. All subjects presented will be open for question and debate.

A number of evening lectures and entertainments will also be provided during the course.

During the course Dr. Reynolds will give two illustrated lectures on ventilation and animal diseases.

AGRICULTURE

The lectures in agriculture will cover the principles of soil formation and classification, soil water, its movements, and effect on plant growth; the relation of tillage to plant growth and the effect of tillage on the conservation of soil fertility. Field crops, their cultivation, growth and care, will be presented from the standpoint of economic relation to farming. A series of discussions of the arrangement of crops and of farm plans will form a cistinctive feature of this subject, thus giving the principles of soil preparation, crop growth and farm management.

AGRICULTURAL CHEMISTRY

The composition and comparative value of food materials, the changes which take lacep during the production, and the appiication of the principles of chemistry to plant and animal life form the basis of this work

ANIMAL HUSBANDRY

In animal husbandry, the work will consist of sketches of the history, development and classification of the various classes of live stock and their relation to farming; of comparisons of the types of each class, and a study of the breeds of horses, cattle, sheep and swine. Good specimens will be used for illustrating the characteristics of each breed and for demonstating the principles of selecting for specific purposes.

BLACKSMITHING

A course of lessons in iron work will be offered to those who desire to prepare for teaching this subject in the common schools. This course will cover the essential principles of forging iron and steel and tempering tools in common use.

DAIRY HUSBANDRY AND ANIMAL NUTRITION

The lectures will cover the characteristics of the various breeds of dairy cattle, their adaptability for the various phases of dairying, and the style or type of cow that has demonstrated her ability as a large and economical producer. Instruction will be given in the scientific principles and practical phases of feeding, and training will be given in calculating and formulating rations.

DAIRY STOCK

The instruction given in dairy stock will be based upon the actua performance of animals bred and reared in the dairy division, the records covering a period of five years giving the annual yield of milk and butter fat and the cost of production and profits.

DOMESTIC ART

The course will consist of lectures and exercises on models and plans for graded work in the public schools, including basting, the seam, the hem, the gusset, the placket, patching, darning, buttonholes and other hand sewing, also garment drafting and making, including the shirt waist. Lectures will be given on the production and use of textiles, the judging of fabrics, the harmony of color, and the beautifying of the useful in the school room.

DOMESTIC SCIENCE

This work will consist of lectures, class room demonstrations and of such library research as will enable students to make bibliography, which will aid in securing reliable data for use in teaching this subject. The principles set forth in the lectures and discussions will be illustrated in either demonstration lectures or in individual practice, as the majority of the class may elect. The various methods of teaching this subject, now in general use, will be discussed and exemplified. In connection with this, a list showing utensils needed for a laboratory kitchen with approximate cost will be compiled and considered.

Results of experiments will be studied to ascertain the best means for introducing into the rurual schools some work along domestic lines.

ENTOMOLOGY

Lectures will be given on the important features represented by this department. Such subjects as scale insects, plant lice, bee keeping, friendly insects, etc., will be dealt with in an effort to make the course as comprehensive as time permits, and suited to the needs of teachers.

HORTICULTURE AND FORESTRY

The course in horticulture and forestry will include lectures and laboratory periods, aimed to illustrate the fundamental principles underlying these subjects, and to show the best way in which they can be taught.

PLANT DISEASES

Lectures will be given on important plant diseases of farm and garden crops; their economic importance, botanical features, and methods of prevention and cure. Demonstrations and exhibitions of material will also be given.

POULTRY

A course of lectures and demonstrations in the care and management of poultry will be given, covering the subjects of poultry buildings, the breeds of poultry, incubation, brooding, feeding, and marketing. This course will be given at the season when incubators and brooders are in use, thus affording a chance for practical work in this line to those who desire it.

SOILS

Formation, physical properties, chemical composition and the judging, rating, and scaling of soils are studied in the laboratory. Lectures are given on the principles of soil fertility and the compoistion and use of farm and commercial manures.

TENTATIVE PROGRAM

Monday, June 21, Registration

	8:15	9:05	9:55	10:45	11:35	1:15	2:05	2:55	3:45
Tuesday, 22nd.....	Agriculture	Fruit Growing	Household Art Lecture	An. Husbandry Cattle	CONFERENCE HOUR.	Chemistry Lecture	Chemical Laboratory		
Wednesday, 23d ..	"	"	"	"		Soils Lecture	Soils Laboratory	Field Practicums	
Thursday, 24th ...	"	"	"	"		Blacksmithing Lecture and Shop Work Household Art			
Friday, 25th.	"	"	Domestic Science Lecture	"		Carpentry Lecture and Shop Work Domestic Science			
Saturday, 26th....	"	Dairy Lectures	"	Sheep		Dairy Lectures	Dairy Practicums		
Tuesday, 29th	"	Vegetable Gardening	"	"		Chemistry Lectures	Chemical Laboratory		
Wednesday, 30th..	"	"	Entomology	Swine		Soils Lecture	Soils Laboratory	Field Practicums	
July— Thursday, 1st.....	"	"	"	"		Blacksmithing Lecture and Shop Work. Household Art			
Friday, 2d........	"	"	"	Poultry		Carpentry Lecture and Shop Work Domestic Science			
Saturday, 3d	"	Dairy Lectures	"	"		Dairy Lectures	Dairy Practicums		
Tuesday, 6th......	"	Forestry	Plant Diseases	Horses		Chemistry Lectures	Chemical Laboratory		
Wednesday, 7th...	"	"	"	"		Soils Lecture	Soils Laboratory	Field Practicums	
Thursday, 8th.....	"	"	"	"		Blacksmith Lecture and Shop Work Household Art			
Friday, 9th.......	"	"	"	"		Carpentry Lecture and Shop Work Domestic Science			
Saturday, 10th....	"	Dairy Lectures	"	"		Dairy Lectures	Dairy Practicums		

THE SHORT COURSE IN TRACTION ENGINEERING

The growing use of traction engines in general farm work has made it advisable to offer a special course in the use of power machinery as one of the "short courses" in the Department of Agriculture of the University of Minnesota.

The course is complete in itself, covering four weeks of study and practice. The mornings are devoted to lectures and class-room work, and the afternoons to actual practice in the various departments under the supervision of the instructors of the school.

Such a course opens a great opportunity to the young man interested in mechanics, or to the one who has had some practical experience in the handling of engines, offering in a short time the training in the theory of engineering.

EXPENSE OF COURSE

The tuition for the entire course is fifteen dollars, payable as a registration fee at the time of entrance. This covers the instruction in all departments, traction stationary and gas engines. No deduction is made if the student elects but a part of the course, or fails to complete work from any cause whatever.

Each student is required to furnish work-clothes, overalls and gloves, and be prepared for expense of car-fare on trips of inspection to visit factories, etc.

ARRANGEMENTS FOR ACCOMMODATION

Good board and room will be furnished on the campus of the school for $3.50 per week. The large dining-hall at the school will be in service, and the dormitory rooms may be used under proper regulations. The rooms have all necessary furniture except pillows, sheets, quilts and towels. These articles may be brought from home by the student, or for a small fee he may rent them for use during the month.

This arrangement will keep all the students together and will allow more time for the practice work in all departments.

REQUIREMENTS FOR ADMISSION

Any person o. good moral character, who can reed and write, may be admitted to this school. No entrance examination is required. The work is made so plain and simple that those whose education is limited may pursue the course with profit. Knowlidge of physics or of algebra is not necessary. Those who have had these subjects may make good use of their knowledge in the course, but they are not required for admission.

TIME OF SESSION

The Short Course in Traction Engineering opens Tuesday, May 24, and continues for four weeks, closing Friday, June 17, 1910. Those desiring to take the course should register and secure boarding places not later than Monday, May 23, as work begins promptly Tuesday morning.

COURSE OF STUDY

TRACTION ENGINES

Steam.—Properties of steam, the steam table, latent heat of vaporization, total heat of vaporization, specific volume of steam, work done by steam, work diagrams, expansion of steam.

Boilers.—Types of boilers: Steam boiler, locomotive boiler, return-flue boiler, the vertical boiler. Construction and repairing of boilers. Boiler materials. Riveted joints, staying flat surfaces, tubes and tube sheets. Boiler fittings: Fusible plugs, grates, safety valve, steam and water gauges, the whistle. Boiler feeders: Pumps, the injector.

Combustion of Fuels.—The process of combustion: Igniting temperature; products of combustion; combustion of carbon complete; combustion of carbon incomplete; combustion of hydrogen; heat of combustion; temperature of combustion; conditions required for economical combustion. Fuels. Firing.

The Traction Steam Engine.—The mechanism of the steam engine. The slide valve and steam distribution: Outside lap, inside lap, angle of advance, effects of lap, lead, position of the eccentric, rocker-arms. direct and indirect valves, setting the slide valve, dead centers, to place the engine on its dead center, directions for setting slide valve. Reversing gears. Single-eccentric reversing gear, the Stephenson link motion. Compound engines: Efficiency of heat engines; absolute zero; absolute temperatures; principles of the compound engine; compound traction engines. Various details of the traction engine: The traction gearing; compensating gear; drive wheels; the governor; cylinder lubricators. Operation and care of the traction engine: General examination; the boiler; feedwater; exhaust nozzles; use of the whistle; the engine; starting the engine; the engine on the road; guiding the engine; the friction clutch; setting the engine; connecting-rod brasses; tests for leaks; friction and lubrication; winter care of the engine; portable engines.

INDICATORS AND INDICATOR DIAGRAMS.—Description of the indicator. Directions for using the indicator: Reducing motion; directions for taking indicator diagrams; points and lines of the diagram. Horse-power: Mean effective pressure; approximate determination of mean effective pressure; piston speed; friction horse-power; net horse-power mechanical efficiency. To find the traction force of a traction engine. Reading indicator diagrams. Operation of traction engine: Ascending and descending hills, pulling load in the sand, in mud, over bridges, getting out of a sink hole, etc.

STATIONARY ENGINES

Although the general principles given with reference to traction engines apply with equal force to stationary engines, yet there are some subjects that should be taught with reference to the stationary engine that do not apply to the traction engine. Students who wish to do so may take this work in a special class that will be formed of those interested in stationary engines.

GASOLINE ENGINEERING

Within the past few years the engines using the explosive power of gas as the means of securing mechanical motion have come into very extensive use. Whereas ten or fifteen years ago such engines were very few in number and very uncertain in results, at the present time they probably outnumber engines of all other kinds, and in point of efficiency they are an undisputed success. The use of denatured alcohol in such engines, it is hoped, will greatly decrease the cost of operation and will increase the number used. Instruction in the construction and operation of gasoline and other engines of this class will be given throughout the term. The use of the gasoline traction engine will also be taught, and practical work on it will be given.

Those who complete the work with the gasoline engine wiil be given a special certificate for that course.

BLACKSMITHING

The competent enginner should know how to handle iron at the forge. He should be able to weld when the necessity arises and to temper his tools skillfully. To the students of this course a series of practical exercises wil be offered covering the elements of iron and setel forging, tool making and tempering. The aim will be to make the course as useful as possible to threshermen and engineers.

BABBITTING

Lectures will be given on babbitt and babbitting. Each student will be required to do actual work in babbitting boxes.

BELT-LACING

Demonstrated lectures are given on the speed of pulleys, belting and belt-lacing. Students are required to figure speed of pulleys and make samples of the belt-lacing in common use.

PIPE-FITTING

Demonstrated lectures are given on pipe-fitting, valves, etc. Students are required to cut and thread pipes and do some work in pipe-fitting.

ROPE-SPLICING

Every thresherman and engineer should know how to splice a rope and tie all the useful knots known to the sailor. A series of lessons in this art will be given covering all the common knots and splices.

SOLDERING

Demonstrated lectures are given on tinning, making soldering acids and soldering iron. Students are required to solder samples of various metals, etc.

TUBE SETTING

Instruction in tube setting is given, and students are required to put in and remove tubes.

LICENSE

A number of states require any man who runs an engine to obtain a license based on an examination held by an inspector. The State of Minnesota has such a law:

"Any person who shall operate any steam boiler or steam machinery of any kind without first obtaining a license from an inspector, shall be deemed guilty of a misdemeanor, and fined not less than twenty-five dollars nor more than fifty dollars."

Engineers shall be divided into four classes, namely:

Chief Engineers;

First Class Engineers;

Second Class Engineers;

Special Engineers.

Chief Engineers must have at least five years' actual experience, and must be qualified to take charge of all classes of steam boilers and steam machinery.

First Class Engineers must have had at least three years of experience, and must show that they are qualified to take charge of all classes of steam boilers and steam machinery not exceeding 300 horse-power.

Second Class Engineers must have had at least one year of actual experience, and be licensed to operate boilers and steam machinery not to exceed 100 horse-power.

Special Engineers, if found competent on examination ,are licensed to operate setam boilers and steam machinery not to exceed 30 horse-power.

Pupils who take the course in this cshool and receive the diploma after examination will receive an engineer's second class license. If the length of service warrants it, first class and chief engineer's licenses will be issued.

Licenses will be issued by the Board of State Boiler Inspectors on payment of the legal fee of $1.00.

The licenses issued in this state will be accepted by most of the states as evidence of qualification to operate steam boilers and steam engines.

INQUIRIES

Anyone desiring further information in regard to these courses may apply to Jas. M. Drew, Registrar, University Farm, St. Paul, Minn.

The Agricultural Experiment Station

STATION OFFICERS

J. W. Olsen, B.S., Director.
J. A. Vye, Secretary.

EXPERIMENT CORPS

Samuel B. Green, B.S., Horticulturist.
Harry Snyder, B.S., Agricultural Chemistry and Soils.
T. L. Haecker, Dairy Husbandry and Animal Nutrition.
M. H. Reynolds, M.D., D.V.M., Verterinarian.
Andrew Boss, Agriculturist and Animal Husbandry.
Frederick L. Washburn, M.A., Entomologist.
E. M. Freeman, M.S., Vegetable Pathology.
John T. Stewart, B.S., Agricultural Engineering.
J. A. Hummel, B.Agr., Assistant Chemist.
Coates P. Bull, B.Agr., Assistant in Agriculture.
A. G. Ruggles, M.A., Assistant Entomologist.
A. J. McGuire, B.Agr., Superintendent, Grand Rapids.
D. A. Gaumnitz, M.S.Agr., Assistant in Animal Husbandry.
LeRoy Cady, B.S., in Agr., Assistant in Horticulture.
A. D. Wilson, B.S.Agr., Assistant in Agriculture.
Wm. Robertson, B.S., Superintendent, Crookston.
C. C. Lipp, D.V.M., Assistant Veterinarian.
A. D. Wilhoit, M.A., Assistant in Soils.
L. B. Bassett. Assistant in Agriculture.
A. R. Kohler, B.S.A., Assistant in Horticulture.
T. P. Cooper, B.S., in Agr., Assistant in Agriculture.
W. H. Frazier, B.S., Assistant in Soils.

The bulletins of this station are mailed free to all residents of this state who make application for them.

The Agricultural Experiment Station of the University of Minnesota was established by National and State legislation in 1887. The function of the Experiment Station as set forth in the Hatch Act is "to aid in acquiring and diffusing among the people useful and practical information on the subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." The funds provided by the National Government have been supplemented recently by the Adams Act which will ultimately provide $15,000 annually, and appropriations for special lines of experimental work have also been made by the State Legislature.

The Experiment Station is located at University Farm, St. Paul, and is one of the Divisions of the Department of Agriculture of the University of Minnesota, and the officers of the station are also professors and instructors in the School and College of Agriculture. The chief executive officer of the station is the Director who is also Dean of the College of Agriculture. Affiliated with the main station are a score or more of trial stations maintained by the State Horticultural Society. The Experiment Station also carries on co-operative tests and investigations with the U. S. Department of Agriculture and with farmers in various parts of the State. The Station has published since its organization in 1887, one hundred nine regular, and thirty-one press and fifteen class bulletins.

The principal lines of work conducted at the station are as follows: Chemistry of soils and farm crops; field experiments—rotations, tests of varieties of cereals and forage crops, time and depth of seeding grains and amount of seed, methods of seeding grasses; horticultural—tests of varieties of fruits and vegetables, use of wind-breaks, testing hardy stocks for apple trees, improvement of native fruits; forestry; diseases of plants; food and nutrition of man; plant and animal breeding; feeding experiments; diseases of animals; entomology, dairying; farm management and farm statistics.

NORTHWEST EXPERIMENT FARM

To give special consideration to local conditions in the northwestern part of the state an experiment farm was established at Crookston in 1895. The farm contains 450 acres and is one mile north of the city. It has a well-equipped poultry plant from which much good breeding stock is being distributed among the farmers. With aid from the U. S. Office of Experiment Stations the farm is taking an active part in testing surface and tile drainage for the Red River Valley region. It is also encouraging a more extensive growing of clover. The Crookston School of Agriculture is operated in connection with the farm. (See page 31).

EXPERIMENT FARM AT GRAND RAPIDS

The legistature of 1895 also provided for a second experiment farm to make possible a more thorough study of the agricultural conditions of the northeastern portions of the state. This farm was located at Grand Rapids April, 6, 1896, and lies two miles east of the village. It contains approximately 375 acres of land, with the necessary farm equipment consisting of dwelling house, barns, machinery, live stock, etc.

Bulletins of the Experiment Station for 1908

GENERAL BULLETINS

Bulletin No. 102—Division of Agricultural Chemistry and Soils. Soil Investigations.

1. Fertilizer tests with wheat and corn.
2. Influence of Fertilizers upon the composition and quality of wheat.
3. A comparison of Chemical methods and field tests for determining the fertilizer requirements of soils.

Bulletin No. 103—Verterinary division. Dissemination of Tuberculosis by the manure of infected cattle.

Bulletin No. 104—Animal husbandry and agricultural divisions. Pork production

Bulletin No. 105—Division of entomology. The importance of the study of entomology. How to collect and preserve insects.

Bulletin No. 106—Division of dairy husbandry and animal nutrition. Investigation in milk production.

The relation of Nutrient to product.

Bulletin No. 107—Division of agriculture. Corn breeding in Minnesota.

Bulletin No 108—Division of entomology. The so-called "Green Bug" and other grain aphids in Minnesota in 1907.

Bulletin No. 109—Divisions of agriculture and agricultural chemistry and soils. The rotation of crops. 1. Report of 10 years on 44 rotation plots. 2. Influence of rotation of crops and continuous cultivation upon the composition and fertility of soils.

PRESS BULLETINS

Press Bulletin No. 28—1 The Fall web worm a menace to Minnesota.

2. Autumn remedies for the stalk borer in flower gardens.

Press Bulletin No. 29—Seed corn shortage.

Press Bulletin No. 30—Bearded Spring wheat compared with blue stem in Minnesota.

Press Bulletin No. 31—Suggestions to those Contemplating spraying.

E

THE COLLEGE of LAW

The College of Law

FACULTY

Cyrus Northrop, LL.D., President.
William S. Pattee, LL.D., Dean and Professor of Law
A. C. Hickman, LL.D., Professor of Law
James Paige, A.M., LL.M., Professor of Law
Henry J. Fletcher, LL.M., Professor of Law
Edwin A. Jaggard, LL.D., Associate Justice of the Supreme Court
Howard S. Abbott, B.L., of the Hennepin County Bar
Robert S. Kolliner, LL.B., of the Hennepin County Bar
Hugh E. Willis, A.M., LL.M., Assistant Professor
Hugh V. Mercer, L.L.M., Minneapolis

LIBRARIAN

Homer W. Stevens

QUIZ MASTER

H. S. Mitchell

LECTURERS

Charles W. Bunn, St. Paul
    Federal Jurisdiction
Christopher D. O'Brien, St. Paul
    Criminal Procedure
Jared How LL.B., St. Paul
    Landlord and Tenant
Cassius M. Ferguson
    Minnesota Practice
F. E. Hobbs, LL.B., Minneapolis
Arthur L. Helliwell, LL. B., Minneapolis

SPECIAL LECTURES FOR 1909–10

Hon. John Lind, Minneapolis; Ex-Governor of Minnesota
    Law of Interstate Commerce

CHARLES B. ELLIOTT, Minneapolis; Justice Supreme Court of Minn.
  Disputed Questions in International Law
A. B. JACKSON, LL.B., Minneapolis
  Conflict of Laws
T. D. O'BRIEN, St. Paul; Ex-Insurance Commissioner
  Proper Exercise of the Police Power of the State
JOHN W. WILLIS, A.B., St. Paul; Ex-Judge of District Court
  Lawyers, Oriental, Medieval and Modern
WM. A. LANCASTER, Minneapolis; Ex-Judge District Court of Minn.
  Impairing Obligation of Contracts
JOHN F. McGEE, Minneapolis; Ex-Judge District Court, Minn.
  Federal Jurisdiction
ROME G. BROWN, LL.B., Minneapolis
  Water-rights
HON. DANIEL FISH, Minneapolis
  Law Making
HON. EDMUND S. DURMENT, St. Paul
  Eminent Domain

The College of Law

OBJECT

It is the object of the College of Law of the University of Minnesota to educate its students by means of the study of jurisprudence, and at the same time to familiarize them with the fundamental principles of positive law so that they will be able, at the end of their course, to safely enter upon the duties of the legal profession. Education, and not simply information, is the prime object. The power to think clearly, to reason cogently, to perceive distinctions quickly, to investigate thoroughly, to generalize carefully and to express his thoughts accurately are the basis qualifications of the safe counsellor. To secure for the students these habits of thought and expression should be the aim of both the student himself and his instructor.

The method of work generally pursued in the college is threefold. First. The reported cases, being the original repositories of the principles of law and equity, are read by the student and considered in the class-room. To facilitate the work and save expense for the student, volumes of these cases are reprinted and put free of charge, into the hands of the student during the continuance of the subject, and each subject is pursued daily until its completion. Second. Besides reading the cases, the student in most subjects is required to prepare a written analysis of each case, stating in his own words, the issue upon which it turns, the law which governs it, a brief statement of the facts, and the conclusion which the law and facts logically necessitate. This practice has proved helpful in securing a greater thoroughness in reading, greater carefulness in reasoning and greater accuracy on the part of the student in the art of expression. Third. In addition to the student's investigation of the cases, and his presentation of them to his instructor, a systematic and orderly arrangement of each subject in the form of a summary, and much additional information regarding the details of the law's application in particular instances, and a consideration of the exceptions, limitations and statutory modifications of general principles, and especially information regarding the art of practice, are indispensable, and are in most instances supplied by printed lectures prepared for that purpose, or by well-written text-books upon the subject under consideration. Information, as well as education, is necessary to prepare a student to begin the practice of law. So far as possible he should, at the end of his course, grasp the various subjects of law in the unity of system, and to do this he must, in many instances take the generalizations of his instructor, or take them from some text-book, until he shall find time to investigate the subject for himself.

LAW BUILDING

The Law building, recently enlarged, is admirably adapted to the uses for which it was constructed. It supplies ample facilities for all the varied exercises of the college. The entire upper story is devoted to the library and reading room, except that portion of it conveniently arranged for the Judge's Chambers, the Court room, the Clerk's office, the Jury room, and the offices of the Dean. Upon the first floor there is a large and convenient auditorium, lecture rooms, and private offices for the professors, besides the general office for the special business of the department. Under the most recently constructed portion of the building there is a well-lighted and convenient basement, devoted to society rooms for the legal literary, and debating organizations. As now reconstructed and arranged the building provides for all the conveniences of a modern court house for the practice department, furnishes ample light and well ventilated reading rooms and other excellent library facilities, and affords sufficient room for all the other regular work of the College.

ENTRANCE REQUIREMENTS

Beginning in September, 1909, candidates for the degree of L.L.B., in order to enter the College of Law, must have completed one year's work in the academic department of the University of Minnesota, or of some other College or University of equal grade.

Such candidates, together with those who have graduated from the academic department of such accredited Colleges or Universities, or have completed more than one year's work therein, may be admitted by presenting their diplomas, or other credentials of the college work they have completed, to the Registrar of the University.

Graduates of a high school, or other school of equal grade, whose course of study extends over a period of four years, may be admitted to the College if 19 years of age, but not for a degree, upon the presentation of their diplomas to the Registrar of the University.

Persons over 21 years of age, who have not the full preparation as required in the foregoing statements, may apply for admittance to the College of Law, but not for a degree, upon presenting their credentials to the Registrar of the University; and if, after considering their qualifications, any such application is accepted, the Registrar will give to such applicant a card of admittance to the College.

ANNOUNCEMENT

Beginning in September, 1911, only those students will be admitted to the College of Law who have completed two or more years of Academic work in some accredited College or University.

Students, however, if they elect studies in both the day and evening courses, pursuing both at the same time, will be charged ten dollars per term additional tuition.

Students in the day or evening classes will not be permitted to attend more than two courses of lectures daily, unless in exceptional cases, and then a card of admission must be procured from the faculty and ten dollars per term additional tuition must be paid.

Students who are regular members of one class, either day or evening, will not be permitted to pursue studies in any class in advance of that to which they belong, unless there are special circumstances requiring it, and only upon special permission granted by the faculty.

SENIOR ELECTIVES

Students in the senior class of the College of Science, Literature and the Arts, are permitted to elect, throughout the senior year, work in the College of Law, including the elements of contracts, domestic relations, torts, criminal law and negotiable paper. The satisfactory completion of the above named subjects will give the student a six hour credit throughout the senior year, and will entitle him to admission to the middle class of the College of Law. No such student will be permitted to take more than one lecture per day in the College of Law, without special permission of the faculty of the College of Science, Literature and the Arts.

ADVANCED STANDING

Should any person desire to enter the middle or senior class for a degree he must pass the required preliminary examination upon the subjects of the preceding year or years, or their equivalents, but no person will be allowed to receive his degree who has not spent one full year in this department. Attorneys at law, however, who have been admitted to practice in the state of Minnesota and have one year of academic work in college may enter the senior class without examination upon presentation of their certificates of admission to the Registrar, and shallbe entitled to their degree upon a satisfactory showing at the final examination of the year upon the entire work of the three years.

ELECTIVES IN OTHER DEPARTMENTS

Students in the College of Law, may be permitted, after the junior year and under proper regulations, to elect work in other departments of the University, without extra charge, so far as it does not interfere with their work in Jurisprudence. The faculty of law encourage students to avail themselves of this opportunity during the middle and senior years, but such election of work should be made only after consultation with the faculty. Among the subjects which may be profitably selected are English sociology, political science, and economics. Students who elect such work must complete it in a satisfactory manner before the degree in law will be conferred upon them.

TRANSFER OF STUDENTS

Students who matriculate in the College of Science, Literature and the Arts, or in other departments of the University, and fail in their work in such college, will not be admitted to the College of Law until such unfinished work shall have been satisfactorily completed.

The faculty earnestly advises all young men contemplating a course in law, and especially those who expect to engage in practice, to take the first two years at least, in the College of Science, Literature and the Arts, and if possible to complete the entire course there, before entering the College of Law.

DAY COURSE OF THREE YEARS

FIRST YEAR—JUNIOR

Contracts (twelve weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Quiz work throughout the subject	MR. MITCHELL
Personal Property and Sales (eight weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Quiz work throughout the subject	MR. HOBBS
Domestic Relations (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Common Law Pleading (three weeks)	PROFESSOR HICKMAN
Text Book, Phillips.	
Torts (nine weeks)	PROFESSOR PAIGE
Illustrative cases.	
Equity (Maxims) (six weeks)	DEAN PATTEE
Illustrative cases.	
Quiz work throughout the subject	MR. MITCHELL
Commercial Paper (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Quiz work throughout the subject	MR. MITCHELL
Blackstone (Second Book) (four weeks)	PROFESSOR PAIGE
Lewis' or Cooley's Blackstone.	
Agency (three weeks)	PROFESSOR PAIGE
Illustrative cases.	
Criminal Law (five weeks)	PROFESSOR PAIGE
Illustrative cases.	
Quiz work throughout the subject	MR. MITCHELL

SECOND YEAR—MIDDLE

Wills and Administration (four weeks) Illustrative cases.	Professor Paige
Chattel Mortgages (three weeks) Illustrative cases.	Professor Fletcher
Partnership (four weeks) Illustrative cases.	Professor Paige
Code Pleading (seven weeks) Phillips on Code Pleading and Illustrative Cases.	Professor Hickman
Liens (two weeks) Illustrative cases.	Professor Fletcher
Bankruptcy (two weeks) Illustrative cases.	Professor Fletcher
Bailments and Carriers (four weeks) Illustrative cases.	Assistant Professor Willis
Private Corporations (five weeks) Illustrative cases.	Robert S. Kolliner
Quiz work throughout the subject	Mr. Ferguson
Public Corporations (three weeks) Illustrative cases.	Howard S. Abbott
Insurance (three weeks) Illustrative cases.	Assistant Professor Willis
Equity (Doctrines) (six weeks) Illustrative cases.	Dean Pattee
Damages (four weeks) Illustrative cases.	Assistant Professor Willis
Real Property (twelve weeks) Illustrative cases.	Professor Fletcher
Quiz work throughout the subject	Mr. Mitchell
Landlord and Tenant (two weeks) Illustrative cases.	Jared How

THIRD YEAR—SENIOR

Evidence (five weeks) Greenleaf on Evidence (Vol. I) and Illustrative cases.	Professor Hickman
Trusts (three weeks) Illustrative cases.	Professor Fletcher
Minnesota Real Property (five weeks) Illustrative cases.	Professor Paige
Constitutional Law (six weeks) Illustrative cases.	Professor Fletcher
International Law (four weeks) Illustrative cases and text-book.	Professor Fletcher
Taxation (four weeks) Professor's text-book and illustrative cases.	Justice E. A. Jaggard
Equity (Remedies) (six weeks) Illustrative cases.	Dean Pattee
Mortgages (four weeks) Illustrative cases.	Dean Pattee
College Court. Each student is required to have two cases in court of Justice of Peace.	
Four cases in District Court.	A. C. Hickman, Judge
One Case in Supreme Court.	W. S. Pattee, C. M. Ferguson H. E. Willis, Justices

FOUR YEAR EVENING COURSE

To accommodate those who cannot attend the school during the day there is offered an evening course, comprising the same subjects as those above enumerated, extending over a period of four years, of nine months each. But if any student in this course will, during the first three years, complete the work of the fourth year, in the day class, he may be allowed to graduate at the end of the third year.

FIRST YEAR

Contracts (eleven weeks) Illustrative cases.	Assistant Professor Willis
Domestic Relations (four weeks) Illustrative cases.	Professor Paige
Personal Property and Sales (seven weeks) Illustrative cases.	Assistant Professor Willis
Torts (nine weeks) Illustrative cases.	Robert Kolliner
Criminal Law (five weeks) Illustrative cases.	Professor Paige

SECOND YEAR

Wills and Administration (four weeks) Illustrative cases.	Professor Paige
Partnership (four weeks) Illustrative cases.	Professor Paige
Equity (Jurisdiction and Maxims) (four weeks) Illustrative cases.	Dean Pattee
Bailments and Carriers (three weeks) Illustrative cases.	Assistant Professor Willis
Private Corporations (six weeks) Illustrative cases.	Robert S. Kolliner
Public Corporations (three weeks) Illustrative cases.	Howard S. Abbott
Commercial Paper (four weeks) Illustrative cases.	Professor Paige
Blackstone (three weeks) Lewis' or Cooley's Blackstone.	Professor Paige
Insurance (three weeks) Illustrative cases.	Assitant Professor Willis
Common Law Pleading (two weeks) Text-book, Phillips.	Professor Hickman

THIRD YEAR

Evidence (five weeks) Greenleaf on Evidence (First Vol.) and illustrative cases.	Professor Hickman
Code Pleading (seven weeks) Phillips on Code Pleading and illustrative cases.	Professor Hickman
Chattel Mortgages (two weeks) Illustrative cases.	Professor Fletcher

Constitutional Law (five weeks) **Illustrative cases.**	PROFESSOR FLETCHER
Equity (Doctrines and Remedies) (seven weeks) **Illustrative cases.**	DEAN PATTEE
Real Property (ten weeks) **Illustrative cases.**	PROFESSOR FLETCHER

FOURTH YEAR

Liens (two weeks) **Illustrative cases.**	PROFESSOR FLETCHER
Real Estate Mortgages (three weeks) **Illustrative cases.**	DEAN PATTEE
Minnesota Real Property (four weeks) **Illustrative cases.**	PROFESSOR PAIGE
Agency (three weeks) **Illustrative cases**	PROFESSOR PAIGE
International Law (three weeks) **Text-book and illustrative cases.**	PROFESSOR FLETCHER
Trusts (three weeks) **Illustrative cases.**	PROFESSOR FLETCHER
Damages (four weeks) **Illustrative cases.**	ASSISTANT PROFESSOR WILLIS
Taxation (three weeks) **Professor's text-book and illustrative cases.**	JUSTICE E. A. JAGGARD

College Court Work, throughout the year.

Special lectures during the year upon the subjects of Abstracts, Practice in the United States Courts, Conflict of Laws, Federal Jurisdiction, Bankruptcy, Criminal Procedure, and Landlord and Tenant.

SPECIAL COURSE

For the benefit of those who do not care to pursue an extended course of legal instruction, but desire such a knowledge of law as will be of value to them in a business career, the foregoing regular courses are arranged so that,upon consultation with the faculty and registration as special students, such men may pursue certain special courses, embracing the following: Contracts, including statute of frauds; agency; commercial paper; partnership; bankruptcy law; liens; bailments; master and servant; insurance; sales and such other subjects as their business life or preference may render desirable.

GRADUATE COURSE

FIRST

For the benefit of those students who wish to pursue their legal studies further than they are able to do in the undergraduate years, two graduate courses are offered, the first leading to the degree of master of laws, (LL.M.), the second to the degree of doctor of civil law, (D.C.L.).

The courses of lectures offered in the first year of graduate work are as follows:

Philosophic basis of jurisprudence.
Roman law.
Political science.
Constitutional jurisprudence and history.

Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other college having a three-year course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws.

But the diploma conferring this degree of LL.M. does not entitle its holder to admission to the bar.

SECOND

Students who have received the degree of LL.B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL.M., from this or some other school, after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to entrance for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis for the doctors' degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the academic year of 1909 and 1910 will depend upon the number of applicants for admission.

TUITION

UNDERGRADUATE STUDENTS

A matriculation fee of ten dollars must be paid by every student entering the college. The tuition fee is sixty dollars a year, or twenty dollars per term payable in advance at the beginning of each term.

GRADUATE STUDENTS

The tuition fee for graduate students is forty dollars per year,payable in advance as follows: twenty dollars at the beginning of the school year, and twenty dollars February 1st following. In addition a matriculation fee of ten dollars is due from each student entering upon the course who has not previously matriculated in this college.

FREE CASE BOOKS

In order to protect the College, Bar Association and State Libraries from the special injury incident to continual use, and to facilitate the class work of the college, free case books are furnished the students by the University.

LIBRARIES

The college has a good library containing those English and American reports most frequently cited, digests, dictionaries, and a full and excellent selection of standard text-books. To this collection additions are being constantly made.

Further facilities are afforded the college by the generous action of the Bar Association of Minneapolis in granting to the students the free use of its extensive and ample library located in the Court House. It contains all the American reports, state and national, and also the English text-books and reports, so necessary for the student in his study of fundamental jurisprudence.

Besides the University and Bar Association libraries, the State library, containing all books which a student would have occasion to consult, is located at the capitol, in St. Paul, and is thus within easy reach of the students.

The general library at the University contains about seventy-five thousand bound volumes, besides many thousand volumes of pamphlets, magazines, reports, etc. About one hundred and twenty periodicals are received regularly by the library, not inclusive of technical magazines and newspapers in English and other languages.

Besides the general library of the University, there are several special libraries, consisting mainly of books of reference and current periodicals relating to technical subjects in connection with the several departments of engineering, biology, and botany. These libraries are open during the entire day, and the University library is open also in the evening.

METHODS OF INSTRUCTION

The recitations of the Junior and Middle day classes occupy the forenoon, and the Senior day class the afternoon, and the evening classes begin their work at seven-thirty P. M. Each subject is continued daily until its completion, one recitation following another immediately, in order to save the student the expense and time required in going to and returning from the University.

Each recitation period continues sixty to ninety minutes, and the work of the class room continues six days each week, except that the Senior day and the night classes do not meet on Saturdays.

EXAMINATIONS FOR PROMOTION

Examination will be held at the close of each subject during the middle and junior years, and no student who fails to pass a satisfactory examination in any of his studies will be advanced to the next higher class, except upon special permission of the faculty; and no such permission will be granted to any student who has failed in more than two subjects; but if he has not failed in more than two subjects he may be admitted to the next higher class provided he makes up those studies in which he is deficient by taking them in the regular classes where they are taught.

At the end of the middle year an examination is held upon the work of both the Junior and Middle years, for such students as the Faculty may select because of their low grades, or because their work, in whole or in part, was taken in another school, and if any student fails to pass this examination satisfactorily to the faculty he will be denied admission to the Senior class.

EXAMINATION FOR GRADUATION

While the grades secured by students upon examination at the end of each subject will, as a general rule, stand as a final grade, yet, if a student has taken any part of his work in an office or in another law school, or for any other reason the faculty consider a review of any student's work desirable, he shall take such examination upon such subjects as the faculty may select, and only upon passing such examination satisfactorily to the faculty, shall he be entitled to his diploma.

COLLEGE COURTS

As fast as the student becomes acquainted with the primary rights of persons, cases are prepared for his consideration, whereby he may apply the principles of law with which he has become familiar.

There is also established in the senior year a system of college courts corresponding to the justice, the district and the supreme courts of Minnesota, wherein the student may become familiar with the practice and the rules of the courts respectively.

It is the aim of the department to acquaint the student with the practice as well as the theory of law, and to this end the subjects of pleading, evidence, rules of practice adopted by our state courts, methods of securing provisional remedies, appeals from one court to another, the writs of habeas corpus, certiorari, and others of frequent use, conveyancing drawing contracts and other like practices which comprise the daily work of the general practioner, will, during the senior year, receive special and careful attention.

Some member of the faculty will preside over each of these courts, and the student is required to prepare appeal papers, bonds, paper books and to furnish the courts with his points and authorities according to requirements of law applicable to the various courts of the state.

STATE AND UNITED STATES COURTS

The department is located with easy reach of both the federal and state courts. The United States courts are in session in St. Paul and Minneapolis during the greater part of the school year. The supreme court of Minnesota, the district courts of Ramsey and Hennepin counties, and the municipal courts of St. Paul and Minneapolis are open and in session almost constantly, and afford all the opportunity for witnessing the trial of actual cases which the student will have either time or desire to improve.

THE LITERARY SOCIETIES

The students of the college have organized three literary societies for the purpose of general improvement and for cultivation in the practice of extemporaneous speaking. They hold weekly meetings and derive great benefit from their exercises.

PRIZES

THE PILLSBURY PRIZE

Three prizes of $100, $50, and $25, offered by the heirs of the Hon John S. Pillbury, are awarded for the best work in the rhetorical department, as evidenced finally by an oration in public.

THE DUNWOODY PRIZE

Mr. Wm. H. Dunwoody, president of the St. Anthony and Dakota

Elevator Co., offers $100 to that student who shall earn the right to represent Minnesota in the Northern Oratorical League. This league is composed of the seven largest universities of the central states, viz: Minnesota, Iowa, Wisconsin and Michigan State Universities, and Oberlin, Chicago and Northwestern.

The Lowden Prize

Mr. Frank O. Lowden, of Chicago, offers a prize to be competed for by the Northern Oratorical League, an endowment of $3,000, which will yield an annual income of about $175. A prize of $100 will be given to the winner of the first place, $50 to the orator who gets second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

DEGREE OF BACHELOR OF LAWS

The degree of bachelor of laws will be conferred upon regular students of good moral character who pursue the full course in this college and pass an approved examination, and the degree will also be conferred upon those who, having attended another law school for the period of two years, shall also attend one year in this college and pass a like examination upon the three years' work. Students who pass their examinations with distinguished excellence will receive the degree of Bachelor of Laws, *cum laude*.

EXPENSES

These depend largely upon the tastes and habits of the individual. Students find no difficulty in obtaining board among the people of the city. Good board can be obtained for $4.00 per week. Students board in clubs at less expense.

For further particulars write to the Dean, W. S. Pattee, and all the information necessary for the student will be furnished promptly. The Dean will be pleased to correspond with any one who is thinking of pursuing a course of legal study. Letters addressed to him at Minneapolis, Minnesota, will receive prompt attention.

ADMISSION TO THE BAR

Students residing in Minnesota are admitted to the bar of this state upon presenting to the court their diploma, conferring the degree of LL.B. without examination or other condition, except that each applicant for admission must furnish a certificate of good moral character, and make affidavit of residence and citizenship in Minnesota.

F

DEPARTMENT OF MEDICINE

The College of Medicine and Surgery

The Department of Medicine

The Department of Medicine includes the following colleges:

The College of Medicine and Surgery
FRANK F. WESBROOK, M.A., M.D., C.M., Dean.
THOMAS G. LEE, B.S., M.D., Secretary and Librarian, Department o Medicine.

The College of Dentistry
ALFRED OWRE, D.M.D., M.D., Dean.

The College of Pharmacy
FREDERICK J. WULLING, Phm.D., LL.M., Dean

Each College is self-governed as to its internal affairs, having its own faculty and an independent curriculum. The laboratories and staff of the College of Medicine and Surgery provide instruction for all students in each of the three colleges, as required, in the following branches:

Gross and microscopic anatomy, physiology, chemistry, pathology, bacteriology and pharmacology.

For the betterment of medical education in Minnesota, it was deemed advisable, after consultation, that the College of Physicians and Surgeons of the Medical Department of Hamline University should merge with the College of Medicine and Surgery of the University of Minnesota. The final formalities were completed at a special meeting of the Board of Regents of the University of Minnesota, held March 4, 1908.

Arrangements were perfected whereby the members of the freshman, sophomore and junior classes of the Medical Department of Hamline University receive their instruction in the University of Minnesota, being required to comply with the rules and regulations which govern the College of Medicine and Surgery of the University of Minnesota. At the end of each year, certificates will be issued by the State University authorities to President Geo. H. Bridgman, D.D., Vice-President J. T. Moore M.D., and Dean C. N. McCollom, M. D., as representing the trustees of the College of Physicians and Surgeons, Medical Department, Hamline University. This arrangement is continued for four years only, for the purpose of enabling the students at that time enrolled in Hamline Medical Department, who satisfactorily complete the requirements for the degree in medicine, to receive the usual degree from Hamline University.

The College of Medicine and Surgery

FACULTY

Cyrus Northrop, LL.D., President

John W. Bell, M.D., Emeritus Professor of Clinical Medicine and Physical Diagnosis.

Charles A. Wheaton, M.D., Emeritus Professor of Surgery.

EXECUTIVE FACULTY

Frank F. Wesbrook, M.A., M.D., C.M., Dean and Professor and Director of the Department of Pathology and Bacteriology

Richard Olding Beard, M.D., Professor of Physiology and Director of the Department of Physiology and Pharmacology

George B. Frankforter, M.A., Ph.D., Professor and Director of the Department of Chemistry.

Charles Lyman Greene, M.D., Professor and Chief of the Department of Medicine

Thomas G. Lee, B.S., M.D., Professor and Director of the Department of Anatomy, Secretary of the Faculty, and Librarian, Department of Medicine

James E. Moore, M.D., Professor and Chief of the Department of Surgery

C. Eugene Riggs, A.M., M.D., Professor and Chief of the Department of Nervous and Mental Diseases

Parks Ritchie M.D., Professor and Chief of the Department of Obstetrics

Alexander J. Stone, M.D., L.L.D., Professor and Chief of the Department of Gynecology

Frank C. Todd., M.D. Professor and Chief of the Department of Diseases of the Eye, Ear, Nose and Throat.

GENERAL FACULTY

Amos W. Abbott, M.D., Clinical Professor of Diseases of Women

Everton J. Abbott, A.B., M.D., Clinical Professor of Medicine

Henry Martyn Bracken, M.D., L.R.C.S. ,(Edin.), Professor of Preventive Medicine

EDGAR D. BROWN, Phm.D., M.D., Professor of Materia Medica and Pharmacology
A. B. CATES, A.M., M.D., Professor of Obstetrics
JAMES T. CHRISTISON, M.D., Professor of Diseases of Children
A. R.COLVIN, M.D., Clinical Professor of Surgery
J. FRANK CORBETT, M.D., Assistant Professor of Surgical Pathology
WARREN A. DENNIS, B.S.,M.D., Clinical Professor of Surgery
IRA H. DERBY, B.S., Assistant Professor of Chemistry
A. W. DUNNING, M.D., Clinical Professor of Nervous and Mental Diseases
FREDERICK A. DUNSMOOR, M.D., Professor of Operative and Clinical Surgery
CHARLES A. ERDMANN, M.D., Professor of Gross and Applied Anatomy
BURNSIDE FOSTER, A.B., M.D., Clinical Professor of Diseases of the Skin and Lecturer upon the History of Medicine
ARTHUR J. GILLETTE, M.D., Professor of Orthopedic Surgery
GEORGE D. HEAD. B.S., M.D., Associate Professor of Medicine
A. C. HEATH, M.D., Clinical Professor in Diseases of the Nose and Throat
H. W. HILL, M.D., Assistant Professor of Bacteriology
CHARLES H. HUNTER, A.M., M.D., Clinical Professor of Medicine
JOHN BLACK JOHNSTON, Ph.D., Professor of Comparative Neurology
WILLIAM A. JONES, M.D., Professor of Nervous and Mental Diseases
FREDERICK LEAVITT, M.D., Clinical Professor of Obstetrics and Clerk of Clinics

J. C. LITZENBERG, B.S., M.D., Clinical Professor of Obstetrics
ARCHIBALD MACLAREN, A.B., M.D., Clinical Professor of Surgery
J. S. MACNIE, M.D., Clinical Professor in Diseases of the Eye and Ear
A. T. MANN, B.S., M.D., Clinical Professor of Surgery and Clerk of Clinics
R. H. MULLIN, B.A., M.B., Assistant Professor of Pathology and Bacteriology
WILLIAM R. MURRAY, A.B., M.D., Professor of Diseases of Nose and Throat
WINFIELD S. NICKERSON, Sc.D., M.D., Assistant Professor of Histology and Embryology
LOUIS N. NIPPERT, M.D., Clinical Professor of Medicine
CHARLES NOOTNAGEL, M.D., Clinical Professor of Medicine and Physical Diagnosis
HENRY J. O'BRIEN, M.D., Clinical Professor of Surgery
ROBERT RETZER, M.D., Assistant Professor of Anatomy
THOMAS S. ROBERTS, M.D., Clinical Professor of Diseases of Children
H. E. ROBERTSON, A.B.,M.D., Assistant Professor of Pathology and Bacteriology
JOHN T. ROGERS, M.D., Clinical Professor of Surgery

John L. Rothrock, A.M., M.D., Clinical Professor of Diseases of Women
F. H. Scott, M.A., M.D., Ph.D,D.Sc. Assistant Professor of Physiology
George E. Senkler, M.D., Clinical Professor of Medicine
A. Shimonek, M.D., Clinical Professor of Surgery
Haldor Sneve, M.D., Clinical Professor of Nervous and Mental Diseases
Henry L. Staples, A.M., M.D., Clinical Professor of Medicine
J. Clark Stewart, B.S. M.D., Professor of Principles of Surgery
Arthur Sweeney, M.D., Professor of Medical Jurisprudence
H. B. Sweetser, M.D., Clinical Professor of Surgery
Max P. Vander Horck, M.D., Professor of the Diseases of the Skin and Genito-Urinary Organs
S. Marx White, B.S., M.D., Associate Professor of Medicine
M. R. Wilcox, M.D., Assistant Professor of Physiology
Louis B. Wilson, M.D., Assistant Professor of Clinical Pathology
______________________,Professor of Homeopathic Materia Medica.
______________________,Professor of Homeopathic Therapeutics.

F. L. Adair, M.D., Clinical Instructor in Obstetrics
Charles R. Ball, M.D., Clinical Instructor in Nervous and Mental Diseases
Geo. C. Barton, M.D., Clinical Instructor in Gynecology
A. E. Benjamin, M.D., Clinical Instructor in Diseases of Women
Herman A. H. Bouman, M.D., Clinical Instructor in Physical Diagnosis
Charles H. Bradley, M.D., Clinical Instructor in Medicine
John B. Brimhall, M.D., Clinical Instructor in Orthopedic Surgery
Frank E. Burch, M.D., Clinical Instructor in Diseases of the Eye and Ear
R. A. Campbell, M.D., Clinical Instructor in Rhinology and Laryngology
W. H. Condit, B.S., M.D., Clinical Instructor in Therapeutics and Materia Medica
Paul B. Cook, M.D., Instructor in Genito-Urinary Diseases
Henry Wireman Cook, A.B., M.D., Instructor in Clinical Medicine
John Grosvenor Cross, B.S., M.D., Clinical Instructor in Medicine
R. E. Farr, M.D., Clinical Instructor in Surgery
Edward Fidlar, B.A., M.B., Demonstrator in Pathology and Bacteriology
Charles F. Dight, M.D., Lecturer in Pharmacology and Materia Medica
C. F. Disen, M.D., Demonstrator in Anatomy
Emil S. Geist, M.D., Clinical Instructor in Orthopedic Surgery
James Gilfillan, M.D., Clinical Instructor in Medicine
Judd Goodrich, M.D., Clinical Instructor in Surgery
Alex R. Hall, M.D., Clinical Assistant in Medicine
Arthur S. Hamilton, M.D., Instructor in Pathology of the Nervous System

Earl R. Hare, B.S., M.D., Instructor in Anatomy
Peder A. Hoff, M.D., Clinical Instructor in Medicine
H. W. Jones, M.D., Clinical Instructor in Nervous and Mental Diseases
Arthur A. Law, M.D., Instructor in Operative Surgery
Jeanette M. McLaren, M.D., Clinical Instructor in Obstetrics
Thomas R. Martin, A.B.,M.D., Demonstrator of Pathology and Bacteriology.
Charles J. Meade, M D., Clinical Instructor in Medicine
L. A. Nelson, M.D., Clinical Instructor in Diseases of Eye and Ear
Henry T. Nippert, M. D., Clinical Instructor in Medicine
E. H. Parker, M.D., Clinical Instructor in Diseases of Nose and Throat
Walter R. Ramsey, M.D., Clinical Instructor in Diseases of Children
Soren P. Rees, B.S., M.D., Instructor in Physical Diagnosis and Clinical Medicine
H. P. Ritchie, Ph.D., M.D., Instructor in Gynecology
Julius Parker Sedgwick, B.S., M.D., Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children
Walter D. Shelden, B.S., M.D., Clinical Instructor in Medicine
Chas. N. Spratt, B.S.,M.D. Clinical Instructor in Diseases of the Eye and Ear
Thos. W. Stumm, M.D., Clinical Instructor in Medicine
S. E. Sweitzer, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases
C. C. Tyrell, B.A., M.D., Prosector in Anatomy
Henry L. Ulrich, B.S., M.D., Instructor in Clinical Microscopy
J. A. Watson, M.D., Clinical Instructor in Diseases of Nose and Throat
Archa Wilcox, M.D., Clinical Instructor in Surgery
H. L. Williams, M.D., Clinical Instructor in Diseases of Women
F. R. Wright, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases

————————————,Clinical Assistant in Medicine
————————————, Demonstrator in Pathology and Bacteriology
John M. Armstrong, M.D., Clinical Assistant in Genito-Urinary Diseases
William H. Aurand, M.D., Clinical Assistant in Medicine
E. R. Bray, M.D., Clinical Assistant in Ophthalmology and Otology
Leslie O. Dart, M. D., Clinical Assistant in Diseases of Children
E. H. Green, A.B., M.D.. Clinical Assistant in Surgery
John E. Hynes, M.D., Clinical Assistant in Medicine
A. E. Loberg, M.D., Clinical Assistant in Nervous and Mental Diseases
John H Morse, B.A. M.D., Clinical Assistant in Diseases of Eye and Ear
John C. Staley, M.D., Clinical Assistant in Medicine
H. Journeay Wells, M.D., Clinical Assistant in Diseases of Eye and Ear
Chas. B. Wright, A.B., M.D., Clinical Assistant in Diseases of Children

GROUNDS

The twenty-three buildings of the University used by all departments of instruction, save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University avenue and the river and between Eleventh and Nineteenth avenues southeast, in the city of Minneapolis. The campus is well wooded with a fine grove of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement. At the last two sessions of the legislature provision was made for the expenditure of eight hundred thousand dollars in campus enlargement during the course of the years 1907–1910, in addition to firty thousand dollars previously contributed by private benefactors. Condemnation proceedings are now in progress for the purpose of obtaining the land desired. About forty additional acres situated to the south of the present campus will be secured. The Department of Agriculture, including the College and School of Agriculture, has a separate campus at St. Anthony Park, in the city of St. Paul, where are located the twenty-five buildings provided for this department and the state experiment station. Adjoining this campus is the University farm of about four hundred and twenty acres.

CLINICAL AND LABORATORY FACILITIES

All the clinical facilities of the State of Minnesota are now available all of the medical interests of the state are harmonized, and the highest standards in medical education and development are assured.

The medical group of buildings is located on the University campus overlooking the Mississippi River and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all of the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health, which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the College of Medicine and Surgery, the gift of the late Dr. A. F. and Mrs. Elliott and of Mr. Walter J. Trask, of Los Angeles, Cal., is in process of construction at a cost of about $160,000. The hospital is being located on a site overlooking the river and will form a part of the new medical group of buildings. This hospital site was purchased by means of a gift of $50,000 from generous citizens of Minneapolis to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which intervenes between it and the other University buildings has already been made by the state legislatures's appropriation of $800,000 for campus extension.

The University clinical building is located across the river within a few hundred yards of the University. It is owned and controlled by the University and is located in a portion of the city best suited for a satisfactory outdoor service.

The Free Dispensary of St. Paul is advantageously located, thoroughly well equipped and manned entirely by this college.

The College of Medicine and Surgery is in intimate relationship with the numerous hospitals, infirmaries and dispensaries of the Twin Cities and also with the medical departments of the various state correctional and charitable institutions for which Minnesota is so justly noted. St. Mary's Hospital, Rochester, St. Mary's Hospital, Duluth, and the Duluth Health Department are in close affiliation with the college through their laboratories.

HOSPITALS

The Twin Cities with a population of over 500,000, through their several hospitals, afford clinical service to the extent of about 2,000 beds. Recently important additions have been made to almost every hospital in the two cities, some of them having doubled their capacity.

The hospital facilities of the University are thus exceptionally good, since they are not limited to one large amphitheatre, where but a few students can closely observe diagnostic and surgical methods, but are divided among a number of hospitals where the various professors care for their clinical cases. This makes it possible to divide the classes into small sections, so that each student has equal opportunities of observation and is in close touch with both teacher and patient.

Pending the completion of the Elliott Memorial Hospital on the University campus the college is using five buildings on the new campus for hospital purposes and for the University Training School for Nurses.

This gives a considerable number of beds in immediate connection with the college, affording excellent opportunities for thorough section work in Medicine and Surgery.

St. Paul City and County Hospital has a capacity of 600 beds and is the largest and most complete of its kind in the northwest. Many of the members of its staff are on the staff of this college and its entire clinical facilities are at the disposal of the college. It enters over 3,000 patients annually, a large proportion of whom are of the emergency order or are suffering from acute disease. The opportunities for bedside instruction are very great, and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A recent and thoroughly modern fireproof pavilion for contagious diseases is provided, where the students have unexcelled opportunities to study diphtheria, scarlatina, erysipelas, etc. A separate building is provided for midwifery, and senior students see labor cases under the personal supervision ot the professor or instructor in obstetrics.

The orthopedic department contains a large number of crippled and deformed children, and houses the State Hospital for Crippled and Deformed Children. All of this work is under the control of the Professor of Orthopedic Surgery of this college.

The City Hospital, Minneapolis, places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital with splendid equipment and has a capacity of 200 beds. During the year 1908, 2,384 patients were treated in the hosiptal, and 3,664 patients in the out-patient department and hospital dispensary. A new administration building has been recently completed by the city at a cost of $55,000, and a pavilion for the care of the incurable is planned for early completion. A modern, newly-erected contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases under the direction of the professor of diseases of children. In the City Hospital, bedside and amphitheatre, medical or surgical clinics are conducted daily throughout the year by members of the faculty. Clinics in diseases of the skin, nervous diseases, obstetrics, etc., are likewise given in the hospital throughout the school year. A special feature is made of medical bedside clinics in the wards of the hospital to small sections of senior students,during the year, by members of the faculty.

Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building, only a portion of which is as yet occupied. It has a capacity of over 100 beds. Many members of the faculty are on the staff of the hospital and give clinics.

St. Joseph's Hospital, St. Paul, with 130 beds and one of the finest amphitheatres with every modern device, contributes largely to the clincal instruction. Members of the faculty are on the staff and give clinics there to the students.

Northwestern Hospital, Minneapolis, affords splendid surgical material, available to this college alone. Semi-weekly clinics in surgery are given in its amphitheatre, and in three operating rooms and wards, by members of the faculty. It has a capacity of 100 beds and during 1908 admitted 1,479 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical clinics. Clinics of this college are held in this hospital by many members of its staff who are on the college faculty. Two operating rooms, with conveniences for students, give unusual facilities and a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 115 beds, is housed in a newly-constructed modern building and members of this faculty exclusively utilize the material of the hospital for teaching purposes. During the year about 1000 are treated.

St. Barnabas Hospital, Minneapolis, with a capacity of 100 beds, now being enlarged to 150 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the year, 1,800 patients are treated at this hospital.

St. Mary's Hospital, Minneapolis, also furnishes clinical material for the University. The hospital is located directly across the Mississippi river from the new University Hospital. It has a capacity of 100 beds and treats 1,200 patients during the year.

The Norwegian Hospital, Minneapolis, is immediately across the river from the new University Hospital. Among other things it provides a sanitorium, now completed, for the treatment of tuberculosis.

DISPENSARIES

In its clinical instruction the medical department makes use of two well-organized free dispensaries, each having a large outdoor service. The University clinical building is located across the river from the medical department proper, at 1810 Washington Avenue S. It is a three-story building, 40x150 feet, situated in a thickly populated part of Minneapolis, and receives nearly twelve thousand patients per year. The staff is composed exclusively of the members of the faculty and their assistants and is organized under a chief of staff.

The service is divided into medical, surgical, gynecological, eye and ear, nose and throat, skin and venereal, mental and nervous departments. Senior students are required to attend daily the clinics at the free dispensary. They are drilled in the taking of histories, the making of physical examinations, etc. Sections of senior students are assigned each day to the drug room of the dispensary and to the clinical laboratory, located in the basement of the building. The free dispensary also provides a residence service for senior students; which is elective and open to a limited number of the senior students. Students electing this service are required to reside at the dispensary and attend the emergency, sick and accident calls, under the direction of a resident, graduate, qualified house officer. This appointment is open to the graduates of this college. An obstetrical out-service department is also conducted and obstetrical cases are assigned to sections of senior students. These clinics are conducted under the direction of some member of the obstetrical staff.

The St. Paul Free Dispensary is centrally located in a twenty-room building, 204 W. Ninth Street, and its clinical service is wholly under the control of the staff of University instructors. Over ten thousand patients are treated during the year. The students of the third and fourth years are on duty two days per week at this dispensary and for certain of the clinical divisions attend every day. See pages 87 to 91

LABORATORY BUILDINGS AND EQUIPMENT

Over $500,000.00 is at present invested in the laboratories and equipment of this college, exclusive of site.

Provision has been made on the recently acquired extension to the University campus of a site of several acres on the bluffs overlooking the Mississippi river, upon which will be erected the new buildings for the college.

Three buildings of this group have already been provided for by legislative appropriation and gift—an Institute of Anatomy costing $200,000, a Medical Science building for Physiology, Pharmacology, Experimental Medicine and Surgery, costing $200,000, and the Elliott Memorial Hospital costing $160,000.

The work of the College of Medicine and Surgery is at present given in eight buildings upon the University campus, exclusive of the three mentioned above, and in the various hospitals and dispensaries of the two cities.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from a close association with the other University departments, such as general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Millard Hall, a large, four-story, brown stone, and cream brick building (65x125 ft.) the oldest of any in the group, contains a faculty room, a large amphitheatre and lecture rooms, library and reading rooms of the department together with the laboratory of pharmacology and materia medica. In addition, the College of Dentistry is temporaily provided with rooms.

The Medical Science building, a large four-story brick building, (75x150 ft.), is especially designed for laboratories. This building houses the department of histology and embryology and the department of physiology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of anatomy occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south ing and the center of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.), constitutes the headquarters of the School of Chemistry. The laboratory of medical chemistry is a one-story, brick building devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, and basement building.

The Institute of Public Health and Pathology is the newest and largest of any in the Medical Quadrangle.

Five buildings are used for the University Hospital and the Training School for Nurses.

LIBRARY OF MEDICAL DEPARTMENT

Thomas G. Lee, B.S., M.D., Librarian

The medical library consists of the following collections: The general clinical library, the libraries of the colleges of Dentistry and Pharmacy, the departmental libraries of pathology and bacteriology, histology and embryology, anatomy, and physiology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, etc., and about 175 current periodicals. In addition to the above, the libraries of the State Board of Health, of Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medical Society with some 7,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications.

The general University library contains some 115,000 bound volumes, 30,000 unbound volumes and pamphlets, and several hundred current periodicals. The public libraries of Minneapolis, with 160,000 volumes, and of St. Paul, with some 90,000 volumes, the State Historical Library of 85,000 volumes, and the State Library of 59,000 volumes, the Library of the Minnesota Academy of Natural Sciences of some 12,000 titles, place before the student the greater part of the important literature relating to all branches of the physical and natural sciences as well as works of general culture and those pertaining particularly to medicine. All of these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition by the department of anatomy, through the generosityof F., John S and Charles C. Pillsbury, of a large portion of the working library of the late Professor William His, of Leipzig, containing about 8,500 titles and representing some 2,500 authors.

Recently the library has secured through the gift of Doctors C. J. and C. H. Spratt the valuable library on Ophthalmology, of Professor Hermann Cohn of Breslau, numbering some 2,000 titles.

THE TRAINING SCHOOL FOR NURSES

The Board of Regents has recently authorized the organization, in connection with the University Hospital service, of a Training School for Nurses. Like the hospital itself, it will exist, primarily, for educational purposes.

It will be conducted by a superintendent and a teaching staff selected from the faculty of the College of Medicine and Surgery, under the direction of a Committee on Training School.

A four years' high school course will be the minimal requirement for admission. Applicants will be required to undergo a sufficient physical examination to determine their fitness for the service, and will offer suitable business and social references.

A preliminary four months' course in anatomy, physiology, chemstry, bacteriology, pharmacology, public health, English, physical culture, principles of nursing and hospital and household economics, will be given to all students of The Training School in the laboratories and lecture rooms of the University.

Examinations at the close of this course must be successfully passed. Students, during this four months' course will not be in residence. The course will be under a fee of $25.00.

Students who have completed this preliminary work, will be admitted to the hospital service on two months' probation.

If finally accepted, they will, thereafter, be entered for the remaining two and one-half years' work in hospital. Examinations will be held at the close of each year's work. The completed course will lead to the degree of Graduate in Nursing, conferred, upon recommendation of the faculty, by the Board of Regents.

For Bulletin and other information address

THE DEAN,
College of Medicine and Surgery,
University of Minnesota.

SIX-YEAR COURSE IN SCIENCE AND MEDICINE LEADING TO THE DEGREES OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

In the year 1903–04 the University established a six-year course of study arranged especially for students of medicine. The first two years of the course are given in the College of Science, Literature and the Arts, and the last four years are given in the College of Medicine and Surgery. It leads to the degree of bachelor of science at the end of the first four years, and to the degree of doctor of medicine at the end of the six-year course.

In the College of Science, Literature, and the Arts the year is divided into two semesters. In the College of Medicine and Surgery the year is divided into four quarters (half semesters). In the College of Medicine and Surgery the work is given on a concentration plan.

Students who enter without French or German are required to take Beginning German, Course 1, ten credits, and Scientific German, Course 3, six credits.

Students entering with two years of German may take Beginning French, Course 1, ten credits, in either first or second year, and German Course 3, six credits, in the other year.

Page reference is made to the bulletins of the College of Science, Literature, and the Arts, and of the College of Medicine and Surgery for more detailed information.

Courses in the College of Science, Literature and the Arts

FIRST YEAR

ANIMAL BIOLOGY (See p. 53)

1. GENERAL ZOOLOGY — PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS OESTLUND, BROWN AND DOWNEY

Six credits (six hours per week) — **First and second semester**

BOTANY (See pp. 57)

1. GENERAL BOTANY — PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL AND INSTRUCTORS

Six credits (six hours per week) — **First and second semester**

CHEMISTRY (See pp. 61)

1 General Chemistry — Miss Cohen and Mr Badger
or,
2. Advanced General Chemistry — Professor Frankforter, Miss Cohen and Mr. Badger
Six credits (six hours per week) — First and second semesters

GERMAN (See p. 96)

1. Beginning German — Professor Schlenker, Assistant Professors Wilkin and Jurgensen, Mr. Burkhard and Mr. William
Ten credits (five hours per week) — First and second semesters

MATHEMATICS (See p. 113)

3. Second Part Higher Algebra — Professor Bauer, Assistant Professor Bussey, Dr. Manchester, Mr. Dalaker and Mr. Shumway
Three credits (three hours per week) — First semester

4. Trigonometry — Professor Bauer, Assistant Professor Bussey, Dr Manchester, Mr. Dalaker and Mr. Shumway.
Three credits (three hours per week) — Second semester

Military Drill — Captain Edward Sigerfoos, U. S. A.
Required of all men — First and second semesters

Gymnasium — Dr. Cooke
Required of all students — First and second semester

SECOND YEAR

ANIMAL BIOLOGY (See p. 53)

4. Comparative Anatomy of Vertebrates — Assistant Professor Brown, Mr Johnson
Six credits (six hours per week) — First and second semester

CHEMISTRY (See p. 61)

3. Qualitative Analysis — Assistant Professor Nicholson, Mr. Frary and Assistants
Six credits (six hours per week) — First and second semesters

ECONOMICS (See p. 70 and 73)

1. Elements of Economics — Professor Robinson, Dr. Phelan and Mr. Coulter
Three credits (three hours per week) — First semester
18. Economic Conditions in American Cities — Mr. Lies
Three credits (three hours per week) — Second semester

FRENCH (See p. 133)

1. Beginning French — Assistant Professors Andrist and Frelin, Madame Bertin
Ten credits (five hours per week) — First and second semesters

GERMAN (See p. 96)

3. Scientific Intermediate — Assistant Professor Jurgenson
Six credits (three hours per week) — First and second semesters

PHYSICS (See pp. 126)

1 and 3. General Physics — Professor John Zeleny
Six credits (three hours per week) — First and second semesters

2 and 4. General Laboratory Practice — Mr. Kovarik
Two credits (two hours per week) — First and second semester

RHETORIC (See p. 130)

1a. Rhetoric — Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith, Miss Whitney
Six credits (three hours per week) — First and second semester

MILITARY DRILL

Military Drill — Captain Edward Sigerfoos, U. S. A.
Required of all men — First and second semesters

Courses in College of Medicine and Surgery

THIRD YEAR

ANATOMY (see p. 41)

1. General Anatomy
One credit (three lectures and recitations per week for six weeks)
First Quarter

2. Osteology — Professor Erdmann, Dr. Hare
Six credits (18 lectures and recitations per week for six weeks)
First quarter
Professor Erdmann, Dr. Hare

. General Vertebrate Morphology and Histology — Professor Lee, Associate Professor Nickerson
Four and one-half credits (six lectures and recitations, three laboratory periods)
First quarter

4. Dissections — Professor Erdmann, Assistant Professor Retzer, Drs. Hare and Disen
Ten and one-half credits (21 hours per week for twelve weeks) — Second semester

8. Splanchnology and Microscopic Anatomy of Man and Vertebrates
Professor Lee, Associate Professor Nickerson
Four and one-half credits (six lectures and recitations, three laboratory periods)
Second quarter

5. ELEMENTS OF VERTEBRATE EMBRYOLOGY PROFESSORS LEE AND JOHNSTON
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

9 ADVANCED VERTEBRATE EMBRYOLOGY PROFESSORS LEE AND JOHNSTON
Three credits (two lectures and recitations, one laboratory period) Second quarter

7. ELEMENTS OF MAMMALIAN NEUROLOGY PROFESSOR JOHNSTON, MR. PAPEZ.
Three credits (two lectures and recitations, one laboratory period) Second quarter

CHEMISTRY (See p. 50)

6. ORGANIC CHEMISTRY PROFESSOR FRANKFORTER, ASSISTANT PROFESSOR DERBY, MR. HANDY
Fifteen credits (six lectures, six laboratory periods) Third and fourth quarters

PHYSIOLOGY AND PHARMACOLOGY (See p.46)

1. GENERAL CELLULAR PHYSIOLOGY PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Third quarter

2. MUSCULO-NERVOUS MECHANISMS PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Third quarter

3. SYSTEMIC PHYSIOLOGY PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Fourth quarter

4. SYSTEMIC PHYSIOLOGY (Continued) PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Fourth quarter

FOURTH YEAR

ANATOMY (See p.43)

11. DISSECTIONS PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DRS. HARE AND DISEN
Nine credits (twenty-four hours per week for nine weeks) Third quarter

10. ANATOMY OF THE SPECIAL SENSE ORGANS PROFESSOR LEE
Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter

14. MICRO-TECHNIQUE AND SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES PROFESSOR LEE
Four and one-half credits (six lectures and recitations three laboratory periods. Third quarter

6. THE HUMAN NERVOUS SYSTEM PROFESSOR JOHNSTON, DR. INGBERT
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

CHEMISTRY (See p. 50)

7. TOXICOLOGY, WATER AND FOOD ANALYSIS PROFESSOR FRANKFORTER, ASSISTANT PROFESSORS HARDING AND DERBY
Three and three-quarter credits (three lectures, three laboratory periods) Second quarter

PATHOLOGY AND BACTERIOLOGY (See pp.52)

1. GENERAL PATHOLOGY PROFESSOR WESBROOK
Three credits (six lectures, recitations and demonstrations) Fourth quarter

2. GENERAL PATHOLOGY ASSISTANT PROFESSORS MULLIN AND ROBERTSON
Three credits (six lectures, recitations and demonstrations) Fourth quarter

3. GENERAL PATHOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSORS MULLIN AND ROBERTSON
Three credits (twelve hours laboratory) Fourth quarter

4. GENERAL BACTERIOLOGY ASSISTANT PROFESSOR HILL, DR. FIDLAR
Three credits (six lectures, recitations and demonstrations) Fourth quarter

5. GENERAL BACTERIOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL, DR. FIDLAR
Four and one-half credits (eighteen hours laboratory) Fourth quarter

PHYSIOLOGY AND PHARMACOLOGY (See p.47)

5. METABOLISM AND NUTRITION PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) First quarter

6. PHENOMENA OF STIMULATION PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) First quarter

7. PHYSIOLOGY OF SPECIAL SENSE ORGANS PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WILCOX AND DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Second quarter

8. PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM PROFESSOR BEARD, ASSISTANT PROFESSORS SCOTT, WICOX AND DR SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Second quarter

ELEMENTARY PHARMACY PROFESSOR BROWN AND DR. DIGHT
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

2. GENERAL PHARMACODYNAMICS PROFESSOR BROWN AND DR. DIGHT
Four and one-half credits (six lectures and recitations, three laboratory periods) Second quarter

SEVEN YEAR COURSE LEADING TO THE DEGREES OF B. A. AND M. D.

(See also page 48, Bulletin College Science, Literature and Arts.)

Students who have completed their junior work in the College of Science, Literature and the Arts in this University, or in certain other colleges of arts and sciences, may elect the first year's work in the College of Medicine and Surgery as the work of their senior academic year, and upon satisfactory completion of the same will receive the degree of A.B. from that college

Students may elect these courses in the College of Medicine and Surgery only by complying with the following regulations.

I. By presenting satisfactory evidence that they have completed three years of academic college work.

II. By filling out the proper application blanks for electing this work. These blanks may be obtained from the Dean of the College of Medicine and Surgery, and after being properly filled out, are to be returned to him for approval and then sent for further approval and record by the proper authorities of the College from which the applicant desires to obtain his degree of B. A.

III. All students entering upon this seven year combined course must present evidence of having completed during the previous three years of college work the following: One year of at least three credit hours per week in each of the following named subjects: (a credit hour in a laboratory subject is taken to be two or more hours of consecutive work.)

1. Physics.
2. General Inorganic Chemistry.
3. Qualitative Analysis.
4. Biology, i. e., Zoology or Botany.
5. Language, i. e., German or French.

In addition each student must offer two years of High School Latin.

IV. Candidates may be allowed to enter with not more than one condition in their academic work. This condition, however, must be removed before the beginning of the second years' work in Medicine.

Note: Provision is made in the summer school at the University for students to make up certain deficiencies or to remove certain conditions. Students are earnestly advised to do this in the summer session immediately preceding the taking up of work in the College of Medicine. According to Rule IV any unfinished work yet remaining must be completed prior to taking up the second year's work in Medicine.

It will be seen that the seven years' course, while a year longer than the B. S., M.D. course, nevertheless permits of a greater range of elective studies. For this reason the seven year course promises to be a very popular one in the future. Students planning to take up Medicine later are strongly advised to arrange their earlier years' work with these requirements in view.

AFFILIATION WITH OTHER COLLEGES

Carleton and Macalester Colleges have entered into an arrangement with University of Minnesota whereby students who have completed three full years' work without conditions and who have also met all the requirements for admission to the College of Medicine and Surgery may elect as the work of their Senior year the first year's work in the College of Medicine and Surgery, upon the satisfactory completion of which they will receive a bachelor's degree from Carleton or Macalester College as the case may be.

By this arrangement students from this college, having satisfactorily completed their four years' work in the College of Medicine and Surgery, will have received both degrees in a period of seven years.

Opportunity is offered to other colleges meeting the University requirements to enter into similar relations of affiliation for the purpose of shortening the time whereby the student can secure both degrees.

COURSE LEADING TO THE DEGREE OF DOCTOR OF MEDICINE IN HOMEOPATHY

The Board of Regents at a meeting held May 6th, 1909, adopted the following resolutions:

"WHEREAS, there is no substantial difference between the Regular and Homeopathic Schools of Medicine except in Materia Medica and Therapeutics, and,

"WHEREAS, there are at this time only three students in Homeopathy in the University, one senior and two juniors, and,

"WHEREAS, it is the sense of this Board that the University continue to furnish instruction to those who elect to study and practice Homeopathy,

"THEREFORE BE IT RESOLVED, that, in lieu of the present Homeopathic organization in the University there be appointed two Professors of Didactic Homeopathy, one of whom shall be Professor of and shall teach Homeopathic Materia Medica, and one of whom shall be Professor of and shall teach Homeopathic Therapeutics and each student who shall so elect, upon completion of the prescribed course, shall be entitled to and shall receive a diploma of "Doctor of Medicine in Homeopathy."

In accordance with above action, in arranging the curriculum, provision is made whereby students wishing to take these courses leading to the degree of "Doctor of Medicine in Homeopathy, "in lieu of those which lead to the degree of "Doctor of Medicine," may do so without conflict with their other medical courses. For further details of the courses see page 50 under the department of Physiology and Pharmacology.

GRADUATE AND SPECIAL STUDENTS

The degree of Master of Arts or Master of Sciences is open to graduates of the College of Medicine and Surgery, who are also Bachelors of Arts or Bachelors of Science of the University of Minnesota, or other colleges who shall be recommended by the Graduate School of the University of Minnesota. Candidates must pursue approved courses in the

College of Medicine and Surgery for at least one year after taking the degree of Doctor of Medicine.

Application for these courses of study must be approved by the Deans of the Graduate School and of the College of Medicine and Surgery.

Opportunity is offered for students registered in the Graduate School to take majors or minors for the degree of M.A. or M.S. in advanced courses in Anatomy, Bacteriology, Embryology, Histology, Neurology, Pathology and Physiology in the College of Medicine and Surgery.

Graduate students of this University or of other colleges or universities who are registered in the Graduate School of the University, may also elect majors or minors in the above scientific branches in the College of Medicine and Surgery toward the degree of Ph.D.

In all cases the students must comply with the rules and regulations of the Graduate School of the University of Minnesota.

Special students properly qualified, whether they be graduates in Medicine or not, may be admitted to many of the courses offered in the College of Medicine and Surgery.

The College of Medicine and Surgery proposes to establish as soon as possible, a summer quarter to provide for both graduate and undergraduate work. Further announcement will be made at the proper time.

Students registered in the Graduate School pay a fee of $10. The amount of additional charges for the various laboratory or other courses open to special or graduate students, can be learned at the Dean's office.

CURRICULUM

The course in the College of Medicine and Surgery leads to the degree of doctor of medicine. It covers a period of four years of collegiate study, each year representing nine months in actual residence.

The studies are graded, so far as practicable, throughout the four years and this grading is arranged with careful reference to the relation which the subjects naturally bear to each other.

The work of the first two years deals with the so-called scientific or laboratory branches; while that of the last two years includes the principles and practice of medicine and surgery, their associated specialties and the application of scientific or laboratory methods to clinical experience.

With a view of further improving the course of instruction and more effectively co-ordinating the work of the various departments, the schedule is now undergoing thorough revision. Hence, the detailed descriptions of the course of instruction, largely based on pre-existing schedule conditions, may be regarded as, in a measure, tentative.

The perfected schedules will be ready for distribution on September

1, 1909, and may be had on application at the Dean's office.

GRADED SYSTEM OF STUDY

The year is divided into four periods of nine weeks each, called quarters. The credit value of each course is computed in terms of credits in the College of Science, Literature, and the Arts.

FIRST YEAR

FIRST QUARTER

GENERAL ANATOMY 1, one credit

OSTEOLOGY 2, six credits, Professor Erdmann, Dr. Hare

DISSECTION 4, three credits, Professor Erdmann, Assistant Professor Retzer, Drs. Hare and Disen

EMBRYOLOGY 5, four and one-half credits, Professor Lee, Professor Johnston

HISTOLOGY 3, four and one-half credits, Professor Lee and Assistant Professor Nickerson

SECOND QUARTER

DISSECTION 4, seven and one-half credits, Professor Erdmann, Assistant Professor Retzer, Drs. Hare and Disen

EMBRYOLOGY 9, three credits, Professors Lee and Johnston

SPLANCHNOLOGY and MICROSCOPIC ANATOMY 8, four and one-half credits, Professor Lee, Assistant Professor Nickerson

NEUROLOGY 7, three credits, Professor Johnston

THIRD QUARTER

CHEMISTRY 6, fifteen credits, Professor Frankforter, Assistant Professor Derby, Mr. Handy

PHYSIOLOGY I, four and one-half credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

PHYSIOLOGY 2, four and one-half credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

FOURTH QUARTER

CHEMISTRY 6, continued

PHYSIOLOGY 3 and 4, nine credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

SECOND YEAR

FIRST QUARTER

Neurology 6, four and one-half credits, Professor Johnston
Pharmacology 1, four and one-half credits, Professor Brown, Dr. Dight
Physiology 5 and 6, nine credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

SECOND QUARTER

Chemistry 7, three and three-quarter credits, Professor Frankforter. Assistant Professors Harding and Derby
Physiology 7 and 8, nine credits, Professor Beard, Assistant Professors Scott and Wilcox, Dr. Sedgwick

THIRD QUARTER

Dissection 11, nine credits, Professor Erdmann, Assistant Professors Retzer, Drs. Hare and Disen
Micro-technique and Embryology 14, four and one-half credits, Professor Lee
Anatomy of Sense Organs 10, four and one-half credits, Professor Lee

FOURTH QUARTER

Pathology 1, three credits, Professor Wesbrook
Pathology 2, three credits, Assistant Professors Mullin and Robertson
Pathology 3, three credits, Professor Wesbrook, Assistant Professors Mullin and Robertson
Bacteriology 4, three credits, Assistant Professor Hill and Dr. Fidlar
Bacteriology 5, four and one-half credits, Professor Wesbrook, Assistant Professor Hill, Dr. Fidlar

For the statement of the courses of the third and fourth years the schedules and detailed announcements must be consulted.

THIRD YEAR

Topographical anatomy, special pathology and bacteriology, surgical pathology, principles of surgery, operative surgery, practice of surgery, practice of medicine, diseases of children, obstetrics, pathology of the nervous system, special neurology, medical jurisprudence, physical diagnosis, clinaicl microscopy, pharmacology and therapeutics, with electives.

FOURTH YEAR

Practice of surgery, practice of medicine, clinical obstetrics, surgical pathology, practical physical diagnosis, therapeutic conferences, nervous and mental diseases, gynecology, ophthalmology and otology, orthopedia, dermatology and genito-urinary diseases, diseases of the nose and throat, hygiene, electives.

COLLEGE YEAR

The twenty-second annual course of study in this college will begin on Tuesday, September 14, 1909, and will continue nine months, or thirty-six weeks, exclusive of holidays, closing upon Saturday, June 4, 1910. The college year is divided into two semesters; each semester is further divided into two quarters of nine weeks each; the first semester ends January 27, 1910. The last week is devoted mainly to mid-year examination, which will be conducted in many of the departments. The second semester will begin January 28, 1910, and will close June 4, 1910. Certain of the courses of study terminate on November 10th, and April 6th. Commencement exercises will occur in common with the other departments of the University, during the week ending June 10, 1910.

Rules and Regulations of College

REQUIREMENTS FOR ADMISSION

I. Candidates for admission to the College of Medicine and Surgery who have received degrees in arts or science from approved universities or colleges will be admitted on presenting their diplomas or other satisfactory testimonials (subject to conditions under IV).

II. Students will be admitted who present evidence that they have satisfactorily performed the equivalent of at least two full years of work of collegiate grade of fifteen hours per week (subject to conditions under IV).

III. Other candidates who have not completed the two years of required work will be required to pass examinations, conducted by the College of Science, Literature and the Arts, upon such subjects as may be lacking (subject to conditions under IV).

IV. All candidates for admission must furnish evidence that they have completed one year of at least three credit* hours per week in each of the following named subjects, either in this University or in some other college or university of equal rank:

1. Physics
2. General Inorganic Chemistry
3. Qualitative Analysis
4. Biology, i. e., Zoology or Botany
5. Language, i. e., German or French.

Since the two years of required collegiate work must include the aforenamed subjects, students are advised to choose the prescribed six-year course which leads to the degree of Bachelor of Science and Doctor of Medicine. For detailed outline of this course see pages 23-28.

V. In addition students must offer for entrance two years of high school Latin.

VI. Candidates may be allowed to enter with not more than one condition. This condition, however, must be removed before the beginning of the second-year work in medicine.

For regulations governing admission to the College of Science, Literature and the Arts, and detailed information concerning its curriculum, see the bulletin of that college.

ENROLLMENT

Students are advised to matriculate or register in the office of the University Registrar on or before September 7, 1909. Entrance and condition examinations will be held September 7 to 11. Opening lecture, September 14. Classes called for regular work on September 14.

Students are fined twenty-five cents per day who matriculate or register in the Registrar's office after September 14, 1909, for the first semester's work, or after January 28, 1910, for the second semester's work.

MATRICULATION

Students who are entering the College of Medicine and Surgery for the first time must present to the Registrar satisfactory evidence of having completed the required amount of work for admission, and obtain the proper classification card and statement of fees. The Registrar will determine and record any deficiency in the entrance qualifications of a student, and will arrange with the student for the removal of such deficiencies.

Students who have matriculated in previous years must first present registration slips and obtain statement of fees in the Registrar's office at the beginning of each semester.

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*NOTE—A credit hour in a laboratory subject is taken to be two or more hours of consecutive work.

REGISTRATION

The registration of all students consists of three parts and should be carried out in the following order:

1st. Present registration slip to the Registrar and secure a statement of fees.

2nd. Present this statement at once to the cashier and pay fees.

3rd. Report to the dean at once for final classification and registration. Students must follow this order and complete registration as promptly as possible in order to secure tickets for entrance to the various courses.

As the rules of the Minnesota State Board of Medical Examiners and of the Council on Medical Education of the American Medical Association, and the examining boards of several other states require four full years' work in a medical college, students are not given time credit for work done outside a medical school.

No student may be advanced with his class or given advanced standing unless he has passed the majority of the required studies of the previous year; nor shall any student be admitted to the second semester's work of the fourth year who has any unremoved conditions of any of the preceding years.

TERMS OF TUITION

The annual tuition fee in the College of Medicine and Surgery is one hundred dollars. This includes all charges for matriculation, lecture and laboratory courses, dissections and graduation, except a hospital fee of three dollars for juniors and seniors and a rental fee for microscopes, payable by all students who do not own their own instruments. (See microscope rental.)

One-half of the annual fee will be payable when the student matriculates. The cashier's receipt for this portion of the fee will entitle the holder to take the entrance examinations and to classify. The second half will be payable at the opening of the second semester, January 28, 1910. Failure to register within the dates assigned for registration will subject the delinquent to an increase in the registration fee, amounting to twenty-five cents for each day of such delinquency. If the applicant fails to pass the entrance examination, his fees will be returned by the cashier. Absence or failure to continue study will not entitle the student to return of fees, except in cases of special hardship, when application may be made to the executive committee of the Board of Regents.

A student who takes advanced standing will not receive any credit therefor upon his annual fees.

A fee of one dollar is charged for permission to take any examination to remove a condition. The student obtains a fee statement from the Registrar for the conditions charged against him; this he presents to the cashier, and the cashier's receipt must be registered with the Dean at least twenty-four hours prior to the examination.

Special examinations may be ordered by the faculty under exceptional circumstances for which a fee of five dollars for each subject must be paid to the University cashier.

MICROSCOPE RENTAL

To students who do not own their own instruments, microscope fees are charged which depend upon the length of the course.

The total cost for all four years approximates ten or twelve dollars, including optional or elective courses.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

A deposit of five dollars will be made with the University cashier each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage in the college buildings and of breakage and loss of laboratory apparatus and materials. It will be returned to the student at the close of each year, minus the cost of articles assigned to him, which are not returned in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

EXAMINATIONS—FINAL STANDINGS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject; nor will any student having a second-year condition or failure be allowed to register for any fourth-year subject.

No student will be allowed to omit any freshman work in order tc make up entrance conditions, except by special permission of the department affected.

Habitual absence without satisfactory excuse, continued indifference to study, or persistently poor scholarship will subject the student to temporary or permanent suspension.

Students will not be permitted to substitute private work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work or at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered toremove conditions at the opening of the school year in September. The examinations at the end of the semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by a conference of the heads of the departments in which the work is pursued during that year.

All standings shall be reported officially to and from the Registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove conditions until he presents a receipt from the cashier for the fee for said examination. (See Terms of Tuition.)

Conditions must be removed at the beginning of the school year in September. No student who has any conditions unremoved at the close of the September examination is allowed to continue with his class without the express permission of the Dean on the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work, by reason of having failed, must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given in any year will become a "failed" student and must repeat the whole work of that year..

Students who carry failures into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

ADVANCED STANDING

Students from other recognized medical colleges applying for admission to the second, third and fourth year classes will be required to present official credentials and other satisfactory evidence of time spent in medical studies and pass examinations in the branches already taken by the class they seek to enter, and to satisfy all other admission requirements; but any student may be excused from such examinations if the instruction which he has received is considered satisfactory by the head of the corresponding department in this college.

No condition of advanced standing will entitle the student to take two years of any graded study coincidentally. Students who desire to obtain advanced standing in some particular subject rather than for a whole college year, may be granted by the head of the department concerned, and approval of the faculty, a proper amount of subject credit.

GRADUATES IN MEDICINE. Graduates from another recognized medical school may obtain the degree of M.D. from this college provided:

1. That he comply with the preliminary requirements for entrance to this college and submit the required time and subject credits.
2. That he be in residence at this college at least one full college year and take at this college all courses not covered by his subject credits and repeat such courses of the fourth year as the faculty may require.
3. The total time spent for all courses taken at this college must be the full equivalent of that required of the fourth year class.
4. He must pass examinations in all the courses in which he is deficient, and all the regular examinations of the fourth year in this college.
5. He must submit his diploma and other official credentials from the medical school from which he graduated.
6. He must comply with all requirements for graduation in force for the students of this college.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

Requirements for License.

Examinations are held in the months of January, April, June and October.

Candidates are required to take examinations in the following subjects: Anatomy, Physiology, Chemistry, Histology, Materia Medica Therapeutics, Preventive Medicine, Practice of Medicine, Surgery, Obstetrics, Diseases of Women and Children, Diseases of the Nervous System, Diseases of the Eye and Ear, Medical Jurisprudence, and such other branches as the Board shall deem advisable.

Candidates will also be required to take practical examinations in Pathology, Histology, Bacteriology, Urinalysis, and Clinical Diagnosis.

The National Confederation of State Licensing and Examining Boards in June, 1906, adopted the requirements of one or two years of college work including at least one year's work in Physics, Chemistry, Biology, and Languages. as the minimum entrance standard to apply to all students beginning the study of Medicine after June 1, 1910. The State Medical Board of Minnesota will, after 1912, require the evidence of the completion of two years academic work in an approved college.

Commencing with 1910 fifty-three medical schools in the United States will require one or more years of college preparatory work to enter Medicine.

REQUIREMENTS FOR GRADUATION

A candidate for the degree of Doctor of Medicine must be twenty-one years of age, of good moral character and after having satisfied all the requirements for admission to the College of Medicine and Surgery, must have complied with all the rules and regulations of the College and obtained regular credit for all the work of the complete course.

STUDENT LOAN FUNDS

THE GILFILLAN TRUST FUND

The Hon. John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the Board of Regents to assist worthy students, needing such aid, to secure an education. The Regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the Regents for the administration of the fund may be learned by addressing the President of the University.

THE ROLLIN E. CUTTS PRIZE IN SURGERY

Dr. Mary E. Smith Cutts, '91 Medical, has given the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of $500, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

Courses of Instruction

DEPARTMENT OF ANATOMY

Thomas G. Lee, B.S., M.D., Professor of Anatomy and Director of the Department of Anatomy
Charles A. Erdmann, M.D., Professor of Gross and Applied Anatomy
John Black Johnston, Ph.D., Professor of Comparative Neurology
Winfield S. Nickerson, Sc.D., M.D., Assistant Professor of Histology and Embryology
Robert Retzer, M.D., Assistant Professor of Anatomy
Earl R. Hare, B.A., M.D., Instructor in Anatomy
Charles F. Disen, M.D., Demonstrator in Anatomy
C. C. Tyrell, B.A., M.D., Prosector in Anatomy
Jarl Ferdinand Lemstrom, M.D., Associate in Histology
Frederick H. Poppe, A.B., M.D., Associate in Histology
James W. Papez, Assistant in Neurology
Harold Aldworth, Departmental Assistant in Histology

The department of Anatomy is at present located in two separate buildings, one building being devoted to the work in dissection. The other divisions of the work of the department including Histology, Embryology, Osteology, Neurology, Topographical Anatomy, Microtechnique, the laboratory and lecture rooms, the departmental library and offices of the staff, the preparation rooms, chemical and photographic laboratories, store rooms, etc., are located in the Medical Science Building, occupying all four floors of the north half of the building, some 17,000 square feet. These various laboratories are adequately equipped with apparatus and material for properly conducting the courses given.

The last legislature appropriated $200,000 for the purpose of erecting a building to be known as the Institute of Anatomy, and which will provide adequate space for the proper development of all of the several divisions of the subject of human and vertebrate anatomy, gross and microscopic. The plans for this building are being made, and when completed it will afford ample opportunities for graduate and undergraduate study and investigation in this subject.

The various anatomical courses occupy portions of the first three years in the college. In the first year Osteology and general courses of Histology, Embryology and Neurology, together with dissection, occupy about half the students' time. In the second year the work in dissection is completed together with advanced and special courses in Neurology, Histology, Micro-Technique, Topographical Anatomy, while in the third year special attention is given to Regional and Surgical Anatomy in co-operation with the departments of Medicine and Surgery.

Each student receives a human skeleton for the purpose of study in Osteology. In Histology, in Embryology and in Neurology in addition to specimens completed by the students themselves, there are very large collections of specially prepared sets of slides and series of embryos which are loaned to the student during the course.

The departmental library contains a carefully selected collection of reference literature both standard and periodical. All of the anatomical periodicals are received and complete sets of nearly all are available. An important addition to the library was the gift of the working anatomical collection of the late Prof. William His, of Leipzig. The other libraries of the University, as well as those of the Twin Cities, render it possible to easily consult practically all of the important anatomical and biological literature.

The abundance of material and other facilities for research work offer very favorable opportunities for students who wish to take majors or minors in some division of anatomy toward their Master's or Doctor's degree. Unusually good opportunities also will be offered to practitioners for doing special work in anatomy.

Courses of Study

1. GENERAL ANATOMY — PROFESSOR LEE

One credit (3 lectures and recitations per week for six weeks) First year, first quarter. Lectures and recitations on general human and vertebrate morphology.

2. HUMAN OSTEOLOGY — PROFESSOR ERDMANN AND DR. HARE

Six credits (eighteen lectures and recitations per week for six weeks)
First year, first quarter

Lectures and recitations and laboratory work upon the human skeleton and supplementary work on the osteology of domestic animals. A practical study of the skeleton, followed by recitations from the specimen.

3. GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY — PROFESSOR LEE
ASSISTANT PROFESSOR NICKERSON

Four and one-half credits (six lectures and recitations, and six hours laboratory work per week) First year, first quarter

The structure and properties of protoplasm; the cell, its structure; the phenomena of cell division. A comparative study of the histology of the epithelial, connective and muscular tissues, the blood, and the vascular and lymphatic systems of man and vertebrates.

4. DISSECTIONS — PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DRS. HARE AND DISEN

Ten and one-half credits (twenty-one hours each week for twelve weeks)
First year, first and second quarters

Open to students who have completed courses 1 and 2.

The student makes a complete dissection of all the structures of either the upper or lower half of the human body, using textbooks, atlases and models as guides.

The work is largely independent, and a dissection must be completed in the quarter in which it is undertaken.

5. ELEMENTS OF VERTEBRATE EMBRYOLOGY PROFESSOR LEE, PROFESSOR JOHNSTON

Four and one-half credits (six lectures and recitations, and six laboratory hours per week) First year, first quarter

A comparative study of reproduction; the ovum, the spermatozoa, fertilization, cleavage, formation of the blastodermic layers, the formation of the embryo and foetal envelopes, with practical work on mammalian and other vertebrate embryos.

6. THE HUMAN NERVOUS SYSTEM PROFESSOR JOHNSTON AND MR. PAPEZ

Four and one-half credits (six lectures and recitations, and six hours laboratory) Second year, first quarter

Open to second-year students who have completed courses 7, 8 and 9, or equivalent.

A detailed study of the internal structure and functional organization of the central nervous system by means of sections of the human brain, with comparison of mammals and lower vertebrates.

7. ELEMENTS OF MAMMALIAN NEUROLOGY PROFESSOR JOHNSTON AND MR. PAPEZ

Three credits (six lectures and recitations, and six hours laboratory per week) First year, second quarter

Open to first-year students who have completed courses 3 and 5, or equivalent.

A study of the structure and relations of the nerve elements and of the general morphology of the central nervous system.

8. SPLANCHNOLOGY AND MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES PROFESSOR LEE, ASSISTANT PROFESSOR NICKERSON

Four and one-half credits (six hours lecture and recitation, and six hours labatory work per week) First year, second quarter

Open to freshmen who have completed courses 3 and 4, or equivalent.

A comparative study of the anatomy, gross and microscopic, of the various organs of the alimentary, respiratory, urogenital, cutaneous, vascular and lymphatic systems.

9. ADVANCED VERTEBRATE EMBRYOLOGY PROFESSOR LEE, PROFESSOR JOHNSTON

Three credits (six lectures and recitations, and six hours laboratory per week) First year, second quarter

Open to first-year students who have completed course 11, or equivalent.

A comparative study of human and mammalian embryos, including impregnation, segmentation and implantation of the ovum, the formation, structure and relationships of the placenta and the foetal envelopes, and the details of organogenesis studied in a practical manner upon a very large collection of serial sections of human and mammalian embryos cut in various planes, and representing all phases of development.

1. THE ANATOMY OF THE SPECIAL SENSE ORGANS INCLUDING NOSE AND THROAT. PROFESSOR LEE

Four and one-half credits (six hours lecture and recitation and six hours laboratory work per week) Second year, third quarter

Open to sophomores or those who have completed courses 6, 8 and 9, or equivalent.

Anatomy of the organs of special sense, gross, microscopic, and developmental, with dissections, study of wet specimens and a large variety of microscopic preparations, laying a broad foundation for the special and clinical courses on these parts.

11. DISSECTIONS PROFESSOR ERDMANN, ASSISTANT PROFESSOR RETZER, DRS. HARE AND DISEN

Nine credits (twenty-four hours each week for nine weeks) Second year, third quarter

Required of sophomores.

In this course the student completes the dissection of the other half of the human body.

12. SPECIAL AND APPLIED NEUROLOGY PROFESSOR JONHSTON AND MR. PAPEZ

One and one-half credits (two lectures and recitations, and two hours demonstrations per week) Third year, fourth quarter

Open to third year students.

Special studies in preparation for the work of the fourth year in pathology and diseases of the nervous system.

14. TOPOGRAPHICAL ANATOMY, MICRO TECHNIQUE AND SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES PROFESSOR LEE, ASSISTANT PROFESSOR RETZER

Four and one-half credits (six lectures and recitations, and six hours laboratory per week) Second year, third quarter

Open to second-year students who have completed courses 8 and 9.

A study of frozen sections, special dissections and of surface anatomy in preparation for the work in medicine, together with assigned problems in the study of embryological series and including the elements of teratology, also a course on the principles and practice of micro-technique, fixation, sectioning, staining, making drawings for illustrations, methods of reconstruction, injection, corrosion methods, museum methods, etc., of especial value to those who intend qualifying for laboratory positions.

15. SURGICAL ANATOMY PROFESSOR ERDMANN

Two and one-half credits (seven hours, lectures and recitations and laboratory each week for nine weeks) Third year, third quarter

Open to students who have completed courses 10, 11 and 14.

A comprehensive review of the relationships of anatomical structures in their application to clinical medicine and surgery, comprising surface anatomy, the outlining of organs, the location and significance of landmarks, determination of blood vessels, and nerves, regional anatomy, influence of muscles in fractures, etc. Instruction is given by means of the living model, cadaver, special dissections, the lantern, models, and a study of frozen sections.

16. THE ANIMAL PARASITES OF MAN ASSISTANT PROFESSOR NICKERSON

Three credits (six hours per week lectures and laboratory) Third quarter

An elective course in Medical Zoology. The general outlines of the morphology and classification of the different groups which contain members parasitic upon man, with special consideration of each species of medical importance, including its distribution, life history, methods of infection, means of diagnosis, and the chief symptoms produced by it.

17. CYTOLOGY AND HISTOGENESIS PROFESSOR LEE

Three credits (lectures and laboratory) Third quarter

Elective course open to students who have had course 3 or 13, or equivalent.

18. EXPERIMENTAL EMBRYOLOGY PROFESSOR LEE

Three credits (lectures and laboratory) Fourth quarter

Elective course for advanced students.

19. RESEARCH IN HUMAN AND VERTEBRATE ANATOMY, HISTOLOGY, EMBRYOLOGY PROFESSOR LEE

Properly qualified students in this and other colleges will be provided every facility for original investigation of anatomical problems of all kinds, either in their application to medicine or as abstract science, as majors or minors for the degrees of M.A., M.S., or Ph.D.

20. NEUROLOGICAL TECHNIQUE PROFESSOR JOHNSTON

Three credits Fourth quarter

Elective course for qualified students.

Practical work in the preparation of the nervous system for gross and microscopic study.

21. THE NERVOUS SYSTEM AND MENTAL LIFE PROFESSOR JOHNSTON

Two credits (two lectures, two demonstrations and reading with reports and discussion per week) Second quarter

Open to a limited number of students by special permission.

The course will include an analysis of nervous mechanisms on the basis of function, followed by a study of the mechanisms of correlation, the growth and education of the nervous system, cerebral functions and localization, and the neural basis of elementary phenomena of consciousness.

22. COMPARATIVE NEUROLOGY OF VERTEBRATES PROFESSOR JOHNSTON

Six credits (six hours lecture and recitations, and four hours laboratory per week) Second quarter

Intended for graduates; open by special permission to seniors who meet the requirements. Prerequisite courses 1 and 2, or 3 in Animal Biology, or courses 3 and 8 in Histology and Embryology.

23. RESEARCH IN NEUROLOGY PROFESSOR JOHNSTON

Open to those who are qualified to carry on investigation.

Problems and special work in vertebrate neurology.

24. COURSE IN ANATOMY FOR DENTAL STUDENTS DRS. HARE AND DIBEN

A specially planned course in Osteology and Dissection. Open only to Dental students. First year, first and second quarters

25. DENTAL HISTOLOGY AND EMBRYOLOGY ASSISTANT PROFESSOR NICKERSON
DR. LEMSTROM

Three credits (four lectures, four recitations, eight hours laboratory per week) First year, fourth quarter

Open to first-year students. A modified course specially arranged and open only to dental students.

The structure and histogenesis of the organs and tissues, the structure and development of the teeth and jaws, the mouth cavity and glands.

26. COURSE IN ANATOMY FOR NURSES PROFESSORS LEE AND ERDMANN

Lectures, recitations, demonstrations and laboratory exercises four hours per week, one semester.

27. ANATOMICAL JOURNAL CLUB AND SEMINAR

Weekly meetings during year for reviews of the current literature and discussion of special topics in anatomy, histology, embryology, and neurology, and of the research work being carried on in the department. The department library, whch is large and rapidly growing, receives all the leading anatomical journals.

The following text-books should be consulted:

Anatomy. Cunningham, Piersol, Morris, Gray, Spalteholtz Atlas, Barker's Laboratory Manual, Cunningham's Manual of Dissection, Treve's Applied Anatomy, Quain's Anatomy, Flower's Osteology of Mammals, Gegenbauer's Elements of Comparative Anatomy, Chauveau's Comparative Anatomy, Wiedersheim's Elements of Comparative Anatomy, McClellan's Regional Anatomy, Deaver's Surgical Anatomy, Hildebrans' Chirurgisch Topographische Anatomie, Schultze's Applied Anatomy, Eisendrath's Clinical Anatomy, Boxe's and Eccults' Applied Clinical Anatomy.

Histology. Stohr-Lewis' Histology; Bohn-Davidoff-Huber's Histology; Bailey's Histology; Ferguson's Histology; Szymonowicz-MacCullum's Histology; Sobotta-Huber's Atlas; Lee's Vade Mecum; Kolliker's Gewebelehre; Oppel's Mikroskopische Anatomie.

Embryoloy. Minot's Human Embryology; Quain's Vol. 1, Part 1.; Minot's Laboratory text-books; Hertwig-Mark's Embryology; Heisler's Embryology; Marshall's Embryology; Kolliker's Embryologie; Schultze's Embryologie; Kollman's Embryologie; Schenk's Embryologie.

Neurology. Johnston's Nervous System of the Vertebrates; Barker's Nervous System; Edinger's Lectures Nervous System; Gordinier's Nervous System; Van Gehuchten's Systeme Nerveaux; Kolliker's Gewebelehre; Obersteiner; Sabin's Atlas.

DEPARTMENT OF PHYSIOLOGY AND PHARMACOLOGY

Richard Olding Beard, M. D., Professor of Physiology and Director of the Department of Physiology and Pharmacology.

E. D. Browh, Phm. D., M. D. Professor of Pharmacology and Materia Medica.

F. H. Scott, M. A., M. B., Ph. D., D. Sc., Assistant Professor of Physiology,

M. Russel Wilcox, M D., Assistant Professor of Physiology.

Julius Parker Sedgwick, B. S., M. D., Instructor in Physiology and Chemistry.

W. H. Condit, B. S., M. D., Instructor in Therapeutics and Materia Medica.

Chas. F. Dight, M. D., Lecturer in Pharmacology.

____________________________Professor of Homeopathic Materia Medica.

____________________________ Professor of Homeopathic Therapeutics.

COURSES OF INSTRUCTION

The department of physiology and pharmacology occupies rooms in the medical science building, and in Millard's Hall, including lecture amphitheatres, a laboratory of experimental physiology, a laboratory of physiological chemistry, a laboratory of pharmacology, demonstration and recitation rooms, the laboratory libraries and offices of the Director and the professors of the department.

In the basement of the medical science building is a well-equipped workshop for the manufacture and repair of apparatus. Here, also, are animal rooms, furnished with enclosures, breeding cages, frog-tanks and aquarium. From the animal room upplies of animals and materials are obtained for the work in physiological chemistry and experimental physiology. The hygienic conditions of the room are carefully studied, with a view to maintaining the physiological and structural integrity of its animal occupants as perfectly as possible.

The physiological and pharmacological laboratories are equipped with a full supply of apparatus, instruments, etc., for experimental purposes, including artificial respiratory machines, batteries, Du Bois Reymond coils, galvanometers, rheostats, Despretz signals, chronographs, moist muscle-chambers, kymographions, spring myographs, stethoscopes, phonendoscopes, stethometers, sphygmographs, cardiographs, sphygmometers, Gaskell's clamps, oncometers, oncographs, hemometers, hemocytometers, hematocrits, ergograph, plethysmograph, and microscopes. Electric motor power is provided for driving apparatus.

The course in physiology is graded in the first and second years. Under the concentration system in vogue, one half of the student's time is occupied with this study during one semester of each of these years.

Each phase of the subject is treated as a unit: i. e., the laboratory courses in physiological chemistry, experimental physiology, physical chemistry, etc., are correlated and interwoven with the lecture courses throughout. The work is essentially practical and is individualized as much as possible.

In the first year, the student takes up the study, first, of the physiologic components of the animal body; next, the physiological and physical properties of tissue -cells in general; the nutritive media; and the neuromuscular mechanisms. He then enters upon the study of systemic physiology, taking in turn, the circulation, digestion, secretion, respiration and excretion. Urinalysis is made a special feature of the work in physiological chemistry. The student is thoroughly drilled in the technique of analytical and estimative methods in the study of the body-fluids.

In the second year, the same methods are applied to the problems of metabolism and nutrition. The student makes a complete nutritive balance, based upon a series of actual feeding experiments, including the analysis of a standard dietary, the qualitative and quantitative examination of the feces and urine, the estimation of the total and differential nitrogens and the determination of respiratory quotients.

In relation to the question of nutrition, the physiology of development and the distinctive physiologic conditions of successive ages of human life are discussed.

The last three quarters of the year are occupied with the discussion and laboratory study of the physiology of the nervous system, special attention being paid to the observation and testing of special sense phenomena, cerebral localization, etc.

The course in pharmacology, materia medica and therapeutics is similarly graded in the second, third and fourth years. By lectures, demonstrations, laboratory experiments and recitations, the student is familiarized with the structure and character of drugs and with pharmaceutical preparations. He observes and experimentally determines the physiologic action of drugs; learns the principles and is drilled in the practice of prescription writing; discusses the indications of therapeutic use, and by the bedside and in the dispensary service applies this knowledge.

Laboratory reference libraries are accessible to the students for purposes of collateral reading.

Courses of Study

PHYSIOLOGY

1. GENERAL CELLULAR PHYSIOLOGY PROFESSORS BEARD, SCOTT AND WILCOX AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, third quarter

The study of the physiologic components of the animal body; the physiologic and physical properties of the tissue-cells in general; the specializations of function; the nutritive media, including methods of blood examination.

2. THE MUSCULO NERVOUS MECHANISMS PROFESSORS BEARD, SCOTT AND WILCOX AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, third quarter

The study of the physiologic chemistry of nerve and muscle tissues; the phenomena of muscle and nerve action; and the principles of nerve control in general; the nature of stimuli and phenomena of stimulation. The student is introduced, in this course, to the technique of experimental study.

3. SYSTEMIC PHYSIOLOGY PROFESSORS BEARD, SCOTT AND WILCOX AND DR. SEDGWICK

Four and one half credits (twelve lecture and recitation periods, six laboratory periods) First year, fourth quarter

The vascular mechanism, including the estimation of blood-pressure, the mapping of cardiac areas, the study of heart sounds, and the making of sphygmograms.

The digestive system, including the process of secretion, the analysis of the digestive fluids, the examination of the normal stomach contents and the conduct of digestions.

4. SYSTEMIC PHYSIOLOGY (Continued) PROFESSORS BEARD, SCOTT AND WILCOX AND DR SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First year, fourth quarter

The respiratory mechanisms; the mechanics, physics, chemistry and nerve control of respiration.

The excretory system, including the study of excretion by the air passages, the intestinal tract, the skin and the kidney. Analysis of the physiological urine is addressed both to the determination of functional facts and to the attainment of the technique of clinical diagnosis in this field.

5. METABOLISM AND NUTRITION PROFESSORS BEARD AND SCOTT AND DR. SEDGWICK

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, first quarter

A study of metabolic and nutritional problems for the determination of nutritive balance, nitrogenous and body equilibrium, and specific dietetic results; including the analysis of standard dietaries and the further examination of the normal stomach contents and the fœcal debris, the estimation of nitrogen excretion in total and in differential forms, the relation of fat splitting and fat-absorption, and the determination of respiratory quotients, etc.

6. THE PHYSIOLOGY OF DEVELOPMENT PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, first quarter

A study of the physiology of the ovum, the embryo and the foetus; of birth, infancy, childhood, puberty, menstruation, ovulation, pregnancy, parturition, maturity and old age.

7. PHYSIOLOGY OF SPECIAL SENSE ORGANS PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second year, second quarter

A study of special sense phenomena and of the means of determining the acuity of, and the influences which condition, special sense function in all its fields.

8. THE PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM PROFESSORS BEARD, SCOTT AND WILCOX

Four and one-half credits (twelve lecture and recitation periods, and six laboratory periods) Second year, second quarter

A study of the functions of the nervous system in general, including the functional relations of nerve tracts, association paths, and central localization.

TEXT BOOKS:
First and second years—
Howell's Text-book of Physiology.
Foster's Physiology, Sixth English Edition.
Abderhalden's Physiologic Chemistry.

COLLATERAL READING: The American Text-book of Physiology; Hammarsten's Physiologic Chemistry; Landois and Sterling's Handbook of Physiology; Van Noorden's Text-book of Metabolism; Stewart's Practical Physiology; Tigerstedt's Physiology; Blyth's Foods and their Composition; Hutchinson's Dietetics.

PHARMACOLOGY

1. ELEMENTARY PHARMACY, GENERAL TOXICOLOGY AND PRINCIPLES OF PRESCRIPTION WRITING PROFESSOR BROWN, DR. DIGHT

Three credits (three hours lecture or recitation per week) Second year, first semester

The course includes the following subdivisions;

(a) Elementary pharmacy; the gross, microscopic and chemic structure of drugs; weights and measures; pharmaceutic processes; and classes of pharmaceutic preparations.

(b) General treatment of poisoning; principles of prescription writing and incompatibilities; principles and rules of incompatibility; rules for solubility; construction of prescriptions; grammar and phrases of prescription-Latin, with class practice in writing simple prescriptions; use and materia medica of flavors.

(c) Materia medica is studied from the crude drugs and pharmaceutic preparations taken from the museum of materia medica to which the students has access at all times.

2. GENERAL PHARMACODYNAMICS (Experimental) PROFESSOR BROWN AND DR. DIGHT

Four and one-half credits (nine hours laboratory work per week) Second year, first semester

Experiments on cold-blooded and warm-blooded animals, illustrating the action of drugs and the methods of pharmacologic experimentation. The class is divided into sections and these sections into groups of three to six students, each group performing experiments in the same line, but by modified methods, on different drugs having a similar pharmacologic action. The results are discussed at conferences, and the conclusions arrived at from the sum of the results. The knowledge thus obtained is by direct observation and serves to impress the student with the actions of drugs and prepares him for the systematic didactic courses given in the third year.

The experimental course includes the following subdivisions:

(a) Actions of drugs on tissues outside the body; corrosives; hemoglobin, osmosis, etc.

(b) Exercise on intact mammals, absorption and excretion of drugs; racial idiosyncrasy; treatment of poisoning; emetics; convulsants and depressants; pulse, pupils; salivation, etc.

(c) Exercises on frogs, convulsants central depressants, local anesthetics, on striped and cardiac muscle, cardiac nerves, etc.

(d) Operative work on mammals, general anesthotics, the effects of important drugs on blood pressure, respiration; oncometric and myocardiographic work; diuresis, peristalsis, perfusion of excised organs, isolated heart, etc.

3. SYSTEMATIC PHARMACOLOGY, TOXICOLOGY, MATERIA MEDICA AND THERAPEUTICS
PROFESSOR BROWN
Three credits (two hours lecture and recitation per week)
Third year, throughout the year

This course is the principal didactic course given in the department. The instruction is given by lectures and recitations. Each drug or group of drugs is studied in detail under the following subdivisions:

(a) PHARMACODYNAMICS. The effects of drugs are studied from the experimental and clinical evidence. Constant reference is made to the results obtained in the experimental course (course 2).

(b) TOXICOLOGY. Symptoms and treatment of poisoning.

(c) MATERIA MEDICA The student is required to be able to identify the more important drugs, learn their physical characters, uses, etc

(d) THERAPEUTICS. The conditions in which the drugs are rationally indicated or in which their empirical use has been found of value.

4. PRESCRIPTION WRITING
One credit (two hours lecture and recitations per week)
Third year, fourth quarter

Hypothetical cases are given and the student is required to write a prescription for the treatment, using the proper drugs which have already been covered in the text.

TEXT BOOK: Pharmacology, Sollmann.

5. PRACTICAL PHARMACY PROFESSOR WULLING
One credit (four laboratory and lecture hours per week)
Third year, third quarter

1. U. S. Pharmacopeia.
   (a) Metrology.
   (b) Grades of drugs in use.
   (c) Pharmacopoeial requirements as to purity.
2. Identity and impurities with U. S. Pharmacopoeial tests of six official substances.
3. Dispensing.
   (a) The prescription.
   (b) Compounding of prescriptions calling for the preparation of fourteen types of pharmacopoeial preparations.

6. THERAPEUTIC CONFERENCES DR. CONDIT
Two credits (one hour weekly) First and second semesters
Required of all seniors.
Conferences on assigned topics to be prepared by students from the point of view of literature and current clinic records, will be conducted weekly.

These will include the therapy of some of the common diseases and also the varied application of some of the common drugs and methods.

TEXT BOOKS:

Pharmacology, Materia Medica and Therapeutics—Sollmann.
Ortner's Treatment of Internal Diseases.
The Prophylaxis and Treatment of Internal Diseases—Forchheimer.

COLLATERAL READING. U. S. Pharmacopoeia; Dosebook and Manual of Prescription Writing—Thornton; National Dispensatory; National Formulary.

HOMEOPATHIC MATERIA MEDICA AND THERAPEUTICS.

An outline of these courses had not been received at the time the bulletin went to press. A reservation of space in the schedule has been provided, however, pending the preparation of the outline.

DEPARTMENT OF CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry.
CHAS. F. SIDENER, B.S., Professor of Chemistry.
EDWARD E. NICHOLSON, M. A., Assistant Professor of Chemistry.
EVERHART P. HARDING, M. S., Ph.D., Assistant Professor of Chemistry.
IRA HARRIS DERBY, B.S., Assistant Professor of Chemistry.
LILLIAN COHEN, M.S., Instructor of Chemistry.
FRANCIS C. FRARY, M.S., Instructor in Chemistry.
JOHN A. HANDY, Ph.C., Instructor in Chemistry.
JAMES ZIMMERMAN, B.A., Instructor in Chemistry.
WALTER L. BADGER, B.A., Instructor in Chemistry.

CHEMISTRY

(Courses in general and advanced general chemistry and qualitative analysis are required for entrance to this college and must precede the instruction in courses 1 and 2 listed below. See p. 34 this catalogue and p. 61 in catalogue of the College of Science, Literature and the Arts.)

1 ORGANIC CHEMISTRY — PROFESSOR FRANKFORTER
Six credits (six hours per week) — First year, second semester

Open to those who have completed courses in general and qualitative chemistry.

Lectures and laboratory work. The course includes an exhaustive study of the theories of organic chemistry, with one or more important preparations in each of the advanced series and groups of compounds.

2. TOXICOLOGY AND HYGIENE — PROFESSOR FRANKFORTER, ASSISTANT PROFESSORS HARDING AND DERBY
Second year, second semester

TOXICOLOGY.—This course includes the general methods for the separation and identification of the poisons both organic and inorganic. Attention will be given to the identification of poisons associated with medicines and with vegetable and animal matter. Besides this qualitative and quantitative work, attention is given to the structure of those organic groups of compounds which have poisonous properties.

HYGIENE.—Chemistry lectures and laboratory work. This course includes the chemical analysis of air, water and some of the common foods, milk, sugar and fruit products. Special attention is given to food adulteration and to food preservatives.

For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry). Facilities for research work are also afforded in a large number of lines.

The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology, and in the clinical laboratories in connection with the microscopy of the urine.

DEPARTMENT OF PATHOLOGY AND BACTERIOLOGY

FRANK F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology, and Director of the Department of Pathology and Bacteriology

R. H. MULLIN, B.A., M.B., Assistant Professor of Pathology and Bacteriology

H. E. ROBERTSON, A.B., M.D., Assistant Professor of Pathology and Bacteriology

H. W. HILL, M.D., Assistant Professor of Bacteriology

LOUIS B. WILSON, M.D., Assistant Professor of Clinical Pathology

J. FRANK CORBETT, B.S., M.D., Assistant Professor of Surgical Pathology

EDWARD FIDLAR, B.A., M.B., Demonstrator of Pathology and Bacteriology

ARTHUR S. HAMILTON, B.S., M.D., Instructor in the Pathology of the Nervous System

THOMAS R. MARTIN, B.A., M.D., Demonstrator of Pathology and Bacteriology

———————————, Demonstrator of Pathology and Bacteriology

CLEMENT C. BLAKELY, M.D., Pathological Interne City and County Hospital, St. Paul

HALLWARD M. BLEGEN, M.D., A.B., Pathological Interne City Hospital, Minneapolis

CLIFFORD A. BOOREN, B.S., M.D., Pathological Interne St. Barnabas Hospital, Minneapolis

LEE POLLOCK, Departmental Laboratory Assistant

The Institute of Public Health and Pathology, to which attention has already been directed, provides adequate room and facilities for teaching and research in pathology, bacteriology and public health.

The main laboratory, 56x75 feet, lighted on three sides and by a skylight, is used for the general or required courses. It is divided into twelve loges, each fully and independently equipped in every detail for the use of six students who are responsible for all equipment therein contained. Supplies are distributed from a supply room opening off the main laboratory. Books and specimens required in teaching are easily procurable from the museum library, which is connected by a special or private passage way with the main laboratory. A combined lecture and autopsy room opens both from the main laboratory and from the hall so that autopsies, lantern demonstrations or lectures may be given during the period devoted to the laboratory exercises without interference with the practical work.

A smaller laboratory, one-half the size of the main laboratory, is provided for special work in graduate and optional courses in the diagnosis of tumors, pathology of the nervous system, practical public health, etc. The same loge arrangement obtains as in the main laboratory.

The hospitals of Minneapolis, St. Paul, Duluth, Rochester and St. Peter, in which members of the staff are working, afford a large supply of material and frequent opportunities for post-mortem examinations. From many institutions and physicians throughout the state, valuable and interesting gross and microscopic materials are received from time to time and are made available in the museum and for macroscopic and microscopic class use.

The State Board of Health laboratories for research and routine investigation are located in the Institute as well as a Pasteur Institute for the study and treatment of rabies. This affords an abundance of illustrative material for public health, pathology and bacteriology.

A full equipment of microscopes permits of the rental of an instrument to each student, if he is not provided with one suitable for his purpose.

METHODS OF INSTRUCTION

In this department the center around which all instruction is grouped is constituted by the student's own personal practical experience in the laboratories. This is supplemented and coordinated by lectures, laboratory and lantern demonstrations and by recitations as required.

1. *GENERAL BACTERIOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL AND DR. FIDLAR

(Twelve lecture and recitation hours and twelve laboratory hours per week)
Second year, fourth quarter

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria are dealt with.

The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media are studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, is thoroughly carried out. Testing of various germicides, chemical and physical and the use of bacteriological methods in the examination of drinking water form an important part of the work. Bacterial activities concerned in sewage purification, etc. receive attention.

2. GENERAL PATHOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSORS MULLIN AND ROBERTSON

Nine credits (twelve lecture and recitation hours, and twelve laboratory hours per week) Second year, fourth quarter

Lectures, demonstrations and laboratory work on the general processes involved in disease, which includes;

(a) Inflammation. The cell reaction to various irritants is carefully studied throughout a variety of tissues and animals, so as to be comparative. As soon as familiarity with cell reaction is insured, the inflammatory processes in the various organs and systems are studied.

(b) Regeneration not already dealt with under inflammation is illustrated by specimens especially prepared from experimental animals and clinical and autopsy material.

(c) Inflammatory reactions and pathological processes dependent upon the activities of the circulatory system, including metastasis, thrombosis, embolism, infarction, etc., are systematically studied.

(d) Degeneration. The theories as to causation and the chemical processes involved are presented on the basis afforded by experimental work, together with a large amount of illustrative clinical material.

(e) The general physical, chemical and biological processes involved in immunity are presented together with practical and illustrative work on the precipitins, agglutinins, opsonins, etc. The pathology of fever is also fully given.

(f) The theories of causation, the general principles involvedandthe classification of tumors are illustrated by a carefully selected assortment of the various types.

3. *Pathology of Special Diseases (includes Bacteriology) Professor Wesbrook, Assistant Professors Mullin and Robertson and Drs. Fidlar and Martin.

Ten credits (four lecture or recitation hours and twelve laboratory hours per week, eighteen weeks) Required in third year, first semester

Disease processes will be grouped, so far as practicable, according to their etiology. Instruction will be afforded by means of lectures, demonstrations of museum specimens and preparations, and laboratory work on materials secured from clinical cases and at autopsy.

The course will consist of instruction in

A. Pathology of infectious diseases.

(a) Special bacteriology of the infectious diseases with the cultivation on the various media of all the important pathogenic bacteria, sown and kept under observation by each student. Fluids and tissues from clinical cases and autopsies (human and animal) will be supplied for microscopic and cultural examination and an intimate relationship with clinical pathological work maintained.

(b) Special pathology of the infectious diseases. Concurrently with the bacteriology and parasitology of each of the diseases, the pathology of each infection will be studied.

The important gross and microscopic lesions in all the organs will be illustrated from clinical and autopsy material, fresh and preserved, and supplemented by experimental work. Each student will be required to prepare and examine under the microscope selected fresh and stained specimens of morbid tissues, fluids, etc.

B. Pathology of diseases of toxic and obscure origin. Under this are included the special degenerations, inflammations and other pathological conditions not already included under infectious diseases.

4. *Medical Pathology (See also Course 21 under Department of Medicine.) Assistant Professor Mullin

Two credits (two lecture hours and four laboratory hours per week) Third year, first quarter

Required of all students.

The course includes:

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*In schedule now under revision Course 1 may be transferred from the second to the first year and ecourses 3 and 4 from the third to the second year.

(a) The urine; a macroscopical study of its colors, and sediments, and the microscopical study of blood, pus, epithelial casts, spermatozoa, etc., in the urine of disease.

(b) The blood; the counting of red and white cells in the blood, the estimation of hemoglobin, the making of blood smears, and the fixing, staining, mounting and studying of all forms of normal and pathological red and white blood cells. In this course students are given specimmens of blood from cases of pernicious anemia, myleogenous leukemia and lymphc leukemia, for study.

(c) Stomach contentas; them acroscopical, chemical and microscopical study of gastric contents in various diseases of the stomach, with special reference to differential diagnosis, by lectures and demonstrations.

(d) Exudates and transudates in various disease of the pleura and peritoneum.

5. AUTOPSIES AND POST-MORTEM TECHNIQUE — ASSISTANT PROFESSORS ROBERTSON AND MULLIN

Required in third and fourth years.

Students will have an opportunity of personally taking part in this work, under the direction of the pathologists in charge, in the hospitals of Minneapolis and St. Paul. A knowledge of the technique of post-mortem work and of morbid anatomy will be thus afforded.

6. SURGICAL PATHOLOGY — ASSISTANT PROFESSOR CORBETT

(Laboratory demonstrations, three hours per week) Third year, first semester

A demonstration laboratory course covering the subjects of surgical inflammations.

Abnormal conditions are demonstrated by gross and microscopic preparations from clinical cases and experimental sources and where possible the actual lesion in the living subject.

7. LABORATORY COURSE ON TUMORS — ASSISTANT PROFESSOR CORBETT

(Three hours weekly) Fourth year, second semester

This course includes the comprehensive study of tumors, with the view of giving the student a knowledge of the methods employed in the laboratory diagnosis of this class of pathological conditions and familiarizing him with the characters of the common as well as the rarer types. It is intended to supplement the course on the surgery of tumors by Professor Stewart.

The work consists of combined study of microscopical sections and gross tumors with their clinical histories illustrated also by photographs and lantern slides (see also courses 10 and 11 under Department of Surgery).

8. SPECIAL PATHOLOGY OF THE NERVOUS SYSTEM — DR. HAMILTON

Two credits (twelve hours per week, first four weeks)

Third year, second semester

So far as possible, the clinical history, autopsy notes, gross specimens and sections stained by various special methods will be presented of individual cases representing the principal organic diseases of the nervous system.

9. RESEARCH WORK IN ONE OF THE FOLLOWING LINES: Second semester of third and throughout the fourth year, hours assigned.

(a) General pathology and bacteriology.

(b) Special pathology and bacteriology.

TEXT BOOKS:

Pathology.—Adami's Inflammation; Delafield and Prudden's Handbook of Pathological Anatomy and Histology.

American Text-book of Pathology.
Ziegler's General and Special Pathology.
Schmaus-Ewing: Pathology and Pathological Anatomy.
Coplin's Manual of Pathology.
Cattel's Post-Mortem Pathology.
Durck-Hektoen: Special Pathologic Histology.
Jakob: Nervous System.
Mallory and Wright's Pathological Technique.

Collateral Reading.—Adami's Principles of Pathology; Hamilton's Text-book of Pathology; Woodhead's Practical Pathology; von Kahlden's Pathological Histology Thoma's Text-book of General Pathology; Lubarsch Ostertag, Ergebnisse der Pathologie u. Anatomie; Orth, Pathologische Anatomie; Birch-Hirschfleld Pathologische Anatomie; Osler's Modern Medicine; Clifford Allbutt's System of Medicine; Leukhart's dieThierische Parasiten des Menschen; Bouchard, Traite de Pathologie Generale; Eichorst, Pathologie du Therapie; Gaylord and Aschoff, Pathological Histology; Nothnagel, Encyclopedia of Practical Medicine.

MEDICAL PATHOLOGY.
(See text-books under Department of Medicine.)

SURGICAL PATHOLOGY.
(See text-books under Department of Surgery.)

HYGIENE

HENRY MARTYN BRACKEN, M.D., L.R.C.S., (Edin), Professor of Preventive Medicine and Secretary of the Minnesota State Board of Health.

F. F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology and Director of the Minnesota State Board of Halth laboratories.

F. H. BASS, B. S., Assistant Professor of Municipal Engineering and acting Sanitary Engineer, Minnesota State Board of Health.

Required of fourth year students, throughout the year

The fundamental portions of this subject are covered in the practical and lecture courses on chemistry of water, air, soil, milk and other food, and in the department of physiology in physiological chemistry.

The life history of bacteria and parasites, which serve to produce communicable diseases, are covered in pathology and bacteriology, as also in the bacteriology of water and milk and in the instruction on germicides and disinfectants.

The remaining portions of the subject and the application of the principles already inculcated in practical sanitation are reviewed in a special course of lectures and by special field work in the fourth year by those who have to deal with sanitation in practical every-day life.

The legal phases of sanitation, including federal, state and municipal hygiene together with the sanitation of various industries and the control of communicable diseases, are fully dealt with.

The relation of the laboratory and field methods to the location of foci of infection, the practical study of the selection of water supplies and the sanitary disposal of sewage and garbage are thoroughly covered,as is also the matter of the sanitary construction of buildings, ventilation and practical school hygiene.

In addition to the lectures and practical work at the college, visits of inspection are made to abbatoirs, dairies, sources of water supply, sewage disposal and garbage plants, detention hospitals for smallpox and other communicable diseases, sanitary camps, sanatoria for tuberculosis, state schools for the deaf, dumb, blind and feeble-minded and the state hospitals for the insane. The officers of these various state and other institutions give instruction to the students and, in addition to the special lecturers listed, instruction is given by certain other state and municipal employees and by charity and social workers. The departments of economics, engineering, dairy husbandry and others in the University and a numerous corps of instructors from the various chairs in this college are used in special instruction.

It is the intention to carry the instruction of this department further each year into an organized coordinated symposium by all of the technical workers in the various lines which have to be reckoned with in public health and for which the municipal and state, executive, technical and educational machinery affords peculiar facilities to this college.

The thanks of the College are herewith tendered to those outside of the College, who have already contributed so largely to the successful teaching in this subject.

TEXT BOOKS:

The various federal, state and municipal reports are fully used, as well as special and general journals. Municipal and state blanks are supplied, particularly those which are used in Minnesota by the State Board of Health.

DEPARTMENT OF MEDICINE

CHARLES LYMAN GREENE, M.D., Professor of Medicine and Chief of the Department of Medicine
CHARLES H. HUNTER, A.M., M.D., Clinical Professor of Medicine
EVERTON J. Abbott, A.B., M.D., Clinical Professor of Medicine
HENRY L. STAPLES, A.M., M.D., Clinical Professor of Medicine
THOMAS S. ROBERTS, M.D., Clinical Professor of Diseases of Children
JAMES T. CHRISTISON, M.D., Professor of Diseases of Children
CHARLES NOOTNAGEL, M.D., Clinical Professor of Medicine and Physical Diagnosis
LOUIS A. NIPPERT, M.D., Clinical Professor of Medicine
GEORGE D. HEAD, B.S., M.D., Associate Professor of Medicine
GEORGE E. SENKLER, M.D., Clinical Professor of Medicine
S. MARX WHITE, B.S., M.D., Associate Professor of Medicine
SOREN P. REES, B.S., M.D., Instructor in Physical Diagnosis and Clinical Medicine
JOHN GROSVENOR CROSS, B.S., M.D., Clinical Instructor in Medicine
PEDER A. HOFF, M.D., Clinical Instructor in Medicine
WALTER R. RAMSEY, M.D., Clinical Instructor in Diseases of Children
HENRY L. ULRICH, B.S., M.D., Instructor in Clinical Microscopy
JAMES GILFILLAN, M.D., Clinical Instructor in Medicine
WALTER D. SHELDEN, B.S., M.D., Clinical Instructor in Medicine
THOS. W. STUMM, M.D., Clinical Instructor in Medicine
CHARLES H. BRADLEY, M.D., Clinical Instructor in Medicine

HERMAN A. H. BOUMAN, M.D., Clinical Instructor in Physical Diagnosis
CHARLES J. MEADE, M.D., Clinical Instructor in Medicine
HENRY T. NIPPERT, M.D., Clinical Instructor in Medicine
HENRY WIREMAN COOK, A.B., M.D., Clinical Instructor in Medicine
WILLIAM H. AURAND, M.D., Clinical Assistant in Medicine
LESLIE O. DART, M.D., Clinical Assistant in Diseases of Children
ALEX R. HALL, M.D., Clinical Assistant in Medicine
JOHN E. HYNES, M.D., Clinical Assistant in Medicine
CHAS. B. WRIGHT A.B., M.D., Clinical Assistant in Diseases of Children
JULIUS PARKER SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children
JOHN C. STALEY, M.D., Clinical Assistant in Medicine
LEVERETT D. BRISTOL, Clinical Assistant in Medicine

GENERAL MEDICINE

Courses in Medicine begin in the second semester of the second year, occupying one hour daily during the fourth quarter.

They occupy six hours per week during the third year and three hours weekly during the fourth year, in addition to the daily section clinics in the University Hospital and Dispensary and the two days of each week devoted to general clinics in the hospitals and dispensaries of the Twin Cities.

In the second year the courses include systematic lectures and quizzes as well as bedside demonstrations.

In the third year the lectures, quizzes, case analyses and recitations are reenforced by the bedside clinics and, so far as possible, the work of the class room and the clinical exercises are correlated.

Test examinations are held at the end of the courses of the second, third and fourth years and practical clinical examinations are required monthly during the third and fourth years, these being supplemented by a general written examination at the end of each year.

The fourth year's work in the class room consists chiefly of the analysis of actual case histories by the members of the class supplemented by explanatory remarks by the instructors. Seminar work also finds its place in the exercises of that year, and students are brought constantly into contact with medical problems of the most practical kind.

Instruction in pediatrics is wholly clinical after the third year.

Medical pathology, including systematic application of laboratory methods to diagnostics is taught in the pathological laboratory during the second semester of the second year and laboratory teachers co-operate with the teaching staff in the University Hospital and Dispensary and the City Hospital of Minneapolis and St. Paul.

Every effort is made to present cases to students in such a manner as will enable them to develop and properly balance the diagnostic features and apply logical and systematic methods. Furthermore the student is constantly drilled in case-taking, physical diagnosis, the use of diagnostic instruments of precision and applied clinical pathology at the bedside, under the Department of Medicine.

1. ELEMENTARY PHYSICAL DIAGNOSIS DR. REES
(Three lectures and recitations per week, six weeks)
Second year, fourth quarter

2. Case-taking and General Symptomatology
Dr. Shelden
(Three lectures and recitations per week, six weeks)
Second year, fourth quarter

3. Diseases of Heart and Blood Vessels
Professor Greene
(Two lectures and recitations per week)
Third year, first quarter

4. Diseases of the Bronchi, Lungs and Pleura
Professor Head or Professor White
(Two lectures and recitations per week)
Third year, first quarter

5. Gastric Ailments
Professor Greene
(Two lectures and recitations per week)
Third year, second quarter

6. Diseases of the Kidney
Professor Nippert
(Two lectures and recitations per week)
Third year, second quarter

The Acute Infectious Diseases
Professor White or Professor Head
(Two lectures and recitations per week)
Third year, second quarter

8. The Acute Infectious Diseases
Professor White or Professor Head
(One lecture and recitation per week)
Third year, third quarter

9. Diseases of the Intestinal Tract, Liver, Pancreas, Spleen and Peritoneum
Dr. Gilfillan
(Two lectures and recitations per week)
Third year, third quarter

1. Diseases of the Blood and Ductless Glands
Professor Head or Professor White
(One lecture and recitation per week)
Third year, third quarter

11. Systematic quizzes reviewing the work of the year
Professors Greene, Head, White and Nippert; Drs. Cross and Gilfillan
(Four lectures and recitations per week)
Third year, fourth quarter

The classroom work of the fourth year in Medicine consists chiefly of case analysis, (using actual case histories) with short explanatory talks by the instructors, seminar work, etc.

12. Case Analysis
(Two exercises per week, fourth year)
First and second quarters
Professor Greene
Third quarter
Professors Head and White
Fourth quarter.
Professor Greene

13. Constitutional Diseases and the Intoxications
Dr. Shelden
(One lecture and recitation per week)
Fourth year, first quarter

14. Diseases due to Animal Parasites
Dr. Ulrich
(One lecture and recitation per week)
Fourth year, third quarter

15. Tropical Diseases
Dr. Cross
(One lecture and recitation per week)
Fourth year. fourth quarter

16. **The Examination for Life Insurance** — Dr. Cooke
(One lecture and recitation per week) — Fourth year, fourth quarter

17 **The Diseases of Children** — Professor Christison
(Two lectures and recitations per week) — Third year, second semester

18. **Clinical Course in the Diseases of Children** — Professor Roberts, Drs. Dart, Wright and Sedgwick

Four hours weekly, third and fourth year at Minneapolis City Hospital, Children's Home, University dispensary and other hospitals.

19. **Clinical Course in the Diseases of Children** — Professor Christison, Dr. Ramsey

Four hours weekly, third and fourth year, at St. Paul City and County Hospital and St. Paul Dispensary.

20. **Medical Pathology.** Combined laboratory and bedside course under the Departments of Medicine and Pathology. (See Course 4 under Department of Pathology and Bacteriology.)

21. **Physical Diagnosis.** In addition to the systematic instruction given under Course 1, the topic is further developed and applied in the University Hospital and Dispensary and the public hospitals of the Twin Cities and special clinical lectures and section clinics are conducted by Professor Nootnagel and Drs. Rees and Boumann.

The class room courses dealing with diseases of the thorax and abdomen, further emphasize and apply the various methods of diagnosis, whether physical, instrumental, chemical or microscopic.

22. **General Medical Clinics**

(a) Students visit the University Hospital daily, take case histories and closely follow and report upon individual patients to whom they are specifically assigned.

(b) Section clinics are held daily in the University Hospital and University Dispensary.

(c) Section Clinics and occasional Clinical lectures occupy the entire afternoon and part of the forenoon on each Thursday and Saturday throughout the entire third and fourth years.

(d) Special Tuberculosis Clinics are held at the special tuberculosis out patient clinics and in the Thomas Hospital.

A detailed statement of the clinics of the past year appears on pages 87 to 91 and will illustrate the methods employed in scheduling the work.

MEDICINE

Text Books. Greene's Medical Diagnosis; Cabot's Physical Diagnosis; Da Costa's Physical Diagnosis; Musser's Medical Diagnosis; Hare's Diagnosis; Leube's Special Medical Diagnosis; Osler's Practice; Edward's Practice of Medicine; French's Practice of Medicine; Tyson's Practice of Medicine; Mering's Lehrbuch der Innere Medizin.

Reference Books. Osler's Modern Medicine; Allbutt's System; Ebstein und Schwalbe's Handbuch; Gibson's Practice of Medicine; Mackenzie on the Heart; Babcock on the Heart Gibson on the Heart and Aorta; Boas on the Stomach and

Intestines; Zweig's Magen und Darmkrankheiten; Bourget-Die Krankheiten des Magens; Greene's Examination for Life Insurance; Cornet; Eichhorst; Manson's Tropical Diseases.

Therapeutics. Forscheimer, Prophylaxis and Treatment; Croftan, Clinical Therapeutics; Ortner, Treatment of Internal Diseases; Yeo, Manual of Treatment; Hutchinson and Collier, Index of Treatment; Wilcox, The Treatment of Disease; Hare, Practical Therapeautics; Eichhorst, Specielle Pathologie und Therapie.

Diseases of Children. Holt's Diseases of Children; Rotch's Pediatrics; American Text-book of Diseases of Children; Keating's Cyclopedia of Diseases of Children; Corlett's Acute Infectious Exanthemata; Chapin's Theory and Practice of Infant Feeding; Stengel's Nothnagel's Encyclopedia.

Medical Pathology. Wood's Chemical and Microscopical Diagnosis; Sahli's Diagnostic Methods; Simon's Clinical Diagnosis; Hutchinson and Rainey's Methods; Emerson's Clinical Diagnosis; Nichol's Clinical Laboratory Methods; Boston's Clinical Diagnosis; Schleip's Atlas of Hematology; Cabot's Clinical Examination of the Blood; Da Costa's Clinical Hematology; Ewing's Pathology of the Blood; Dickson, The BoneMarrow; Ogden's Clinical Examination of the Urine; Braun, Animal Parasites of Man.

DEPARTMENT OF SURGERY

James E. Moore, M.D., Professor of Surgery and Chief of the Department of Surgery

Frederick A. Dunsmoor, M.D., Professor of Operative and Clinical Surgery

J. Clark Stewart, B.S., M.D., Professor of Principles of Surgery

Max P. Vander Horck M.D., Professor of the Diseases of the Skin and Genito-Urinary Organs

Archibald MacLaren, A.B., M.D., Clinical Professor of Surgery

Arthur J. Gillette, M.D., Professor of Orthopedic Surgery

Burnside Foster, A.B., M.D., Clinical Professor of Diseases of the Skin and Lecturer upon the History of Medicine

Henry J. O'Brien, M.D., Clinical Professor of Surgery

John T. Rogers, Clinical Professor of Surgery

A. T. Mann, B.S., M.D., Clinical Professor of Surgery and Clerk of Clinics

H. B. Sweetser, M.D., Clinical Professor of Surgery

A. Shimonek, M.D., Clinical Professor of Surgery

Warren A. Dennis, M.D., Clinical Professor of Surgery

A. R. Colvin, M.D., Clinical Professor of Surgery

J. Frank Corbett, M.D., Assistant Professor of Surgical Pathology

Judd Goodrich, M.D., Clinical Instructor in Surgery

F. R. Wright, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases

John B. Brimhall, M.D., Clinical Instructor in Orthopedic Surgery

Arthur A. Law, M.D., Instructor in Operative Surgery

R. E. Farr, M.D., Clinical Instructor in Surgery
S. E. Sweitzer, M.D., Clinical Instructor in Dermatology and Genito-Urinary Diseases
Archa Wilcox, M.D., Clinical Instructor in Surgery
Emil S. Geist, M.D., Clinical Instructor in Orthopedic Surgery
Paul B. Cook, M.D., Instructor in Genito-Urinary Diseases
John M. Armstrong, M.D., Clinical Assistant in Genito-Urinary Diseases
E. K.. Green, A.B., M.D., Clinical Assistant in Surgery

COURSES OF INSTRUCTION

The course in surgery is graded in the third and fourth years. Examination are held at the close of each of these years. Lectures and recitations are given by the teaching staff in surgery and clinics at the dispensaries and hospitals of Minneapolis and St. Paul by a large corps of instructors.

1. Surgical Pathology — Assistant Professor Corbett
Laboratory demonstrations, three hours per week, third year, first semester

A demonstration laboratory course covering the subjects of surgical inflammations.

Abnormal conditions are demonstrated by gross and microscopic preparations and experimental sources, and where possible by similar lesions on the living subject. (See also Course 6 under Pathology and Bacteriology.)

2. Principles of Surgery — Professor Stewart
Lectures, two hours weekly — Third year, first semester

Systematic discussion of the diseases and injuries of the bones and joints except fractures and dislocations); injuries and diseases of the skin, lymphatics, blood vessels (including aneurism) and nerves; of the tendons, fasciae and bursae.

Lectures will be illustrated by lantern slides and demonstration of gross specimens.

3. Operative Surgery — Professor Dennis
One hour a week, — Third year, third quarter

Lectures upon the principles of operative procedure; the preparation of patient operator and operating rooms; the principles of asepsis, antisepsis and sterilization; ligatures and sutures; and the treatment of wounds.

4. The Practice of Surgery — Professor Moore
Lectures and recitations, three hours a week. Third year, second semester

Fractures and dislocations; regional surgery.

5. The Practice of Surgery — Professor Moore
Three hours a week. — Fourth year, first semester

Surgery of the head, neck, chest, back, breast, abdomen, including hernia, anus, rectum and urinary tract. Lectures and recitations.

6. Operative Surgery — Professor Erdmann, Dr. Law
Laboratory course, — Fourth year, first quarter

Practical exercises on the cadaver illustrative of the courses in surgery.

7. ORTHOPEDIC SURGERY PROFESSOR GILLETTE

Lectures and recitations, three hours a week. Fourth year, fourth quarter

This includes diseases of bones, joints, synoviae and bursae, congenital and acquired deformities; dystrophies, with the principles of treatment.

8. DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASES

PROFESSOR VANDER HORCK

Two lectures and recitations per week. Fourth year, second semester

9. CLINICAL LECTURES ON DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASE

PROFESSORS VANDER HORCK AND FOSTER, DRS. WRIGHT AND SWEITZER

Weekly at Minneapolis and St. Paul Citv Hospitals and daily at the University Clinical Building and St. Paul Dispensary. Fourth year

10. TUMORS PROFESSOR STEWART

Lectures and demonstrations,two hours a week. Fourth year,second semester

The course on tumors is comprehensive, including a complete systematic laboratory course on tumor histology by Professor Corbett and regional tumor surgery with lantern slide demonstrations by Professor Stewart. The general subject of tumors, their life history, classification, pathogenesis, diagnosis and treatment is taken up by lectures.

Regional surgery of tumors is also considered fully and is copiously illustrated by lantern slides.

11. LABORATORY COURSE ON TUMORS ASSISTANT PROFESSOR CORBETT

Three hours weekly. Fourth year, second semester

Each variety of tumor is taken up and studied. Students are given sections illustrating same. With this microscopic study is combined recitation and demonstrations or gross tumors with histories, photographs and lantern slides. (See also Course 7 under Department of Pathology and Bacteriology.)

12. BANDAGING, DRESSINGS AND MINOR SURGERY DR. LAW

Eight hours Fourth Year

A practical course of instruction in which the student is required to apply bandages and dressings himself. Anesthesia and anesthetics.

13. CLINICAL SURGERY

Courses of clinics at which operations, in the whole domain of surgery, are witnessed by the students of the third and fourth years. These clinics are held in the dispensaries and hospitals of the cities of Minneapolis and St. Paul, upon Thursdays and Saturdays throughout the year. The classes alternate at the two cities in their attendance upon these clinics. They are conducted personally, throughout the year, by the clinical chiefs and their associates as follows:

University hospital clinics, medical and surgical clinics will be held every Thursday and Saturday, the former by Professor Greene and his assistants, and the latter by Professor Moore and his assistants. Bedside clinics will be given throughout the week by various members of the staff.

At the City and County Hospital, St, Joseph's Hospital, St. Luke's Hospital

in St. Paul, weekly, by Professor John T. Rogers.

At the City and County Hospital, St. Joseph's Hospital, St. Luke's Hospital or Free Dispensary, in St. Paul, with sections of class weekly, by Professor John T

Rogers, Dr. C. M. Coon, Professor A. J. Gillette, Dr. W. A. Dennis, Dr. Judd Goodrich and Dr. A. Colvin.

At St. Luke's Hospital, Professor Archibald McLaren.

At St. Joseph's Hospital, Professor H. J. O'Brien.

At the Swedish Hospital or the City Hospital, Minneapolis, weekly, by Professor F. A. Dunsmoor.

At the City Hospital, Minneapolis, weekly, by Professors J. Clark Stewart and A. T. Mann.

TEXT BOOKS

SURGERY. Park's Surgery; Rose and Carless' Surgery; International Text-book of Surgery; Warren's Surgical Pathology and Therapeutics; Surgical Diagnosis, Berg; Bryants' Operative Surgery; Binnie's Operative Surgery; Scudder on Fractures; Stimson on Fractures; Moore's Orthopedic Surgery; Bradford's and Lovett's Orthopedic Surgery; Whitman's Orthopedic Surgery; Lexer's Handbook of Surgery; Taylor's Orthopedic Surgery.

DERMATOLOGY, GENITO-URINARY AND VENEREAL DISEASES. Key's or White and Martin's Diseases of Urinary Organs; Lydston's Genito-Urinary, Venereal and Sexual Diseases; Hyde's Diseases of the Skin; Walker's Dermatology; Jackson's Diseases of the Skin; Hyde and Montgomery's Venereal Diseases; Crocker's Diseases of Skin; Morris' Diseases of the Skin; Hayden's Diseases of the Skin; Stelwagon's Diseases of the Skin; Taylor's Genito-Urinary and Venereal Diseases of the Skin.

DEPARTMENT OF OBSTETRICS

PARKS RITCHIE, M.D., Professor of Obstetrics, and Chief of Department of Obstetrics.

A. B. CATES, A.M., M.D., Professor of Obstetrics.

FREDERICK LEAVITT, M. D., Clinical Professor of Obstetrics.

JENNINGS C. LITZENBERG, B.S., M.D., Clinical Professor of Obstetrics.

JEANETTE M. MCLAREN, M.D., Clinical Instructor in Obstetrics.

F. L. ADAIR, M.D., Clinical Instructor in Obstetrics

COURSES OF INSTRUCTION

The subject of obstetrics is taught by lectures, recitations and demonstrations upon the manikin; by illustrative drawings and by attendance upon cases of labor. The didactic work is done in the third year; the clinical study is had in the fourth year. A large part of the obstetrical service of the City Hospital in St. Paul and of the Minneapolis City Hospital is at the disposal of the department of obstetrics. Clinics are also held at other hospitals in St. Paul and Minneapolis.

1. THE ANATOMY AND PHYSIOLOGY OF THE PELVIC ORGANS — PROFESSORS RITCHIE AND CATES

Lectures and recitations, two hours a week in October and January, and three hours a week, second semester, third year.

The development of the embryo and appendages; pregnancy; symptoms and diseases; operative obstetrics; the complications of labor and its sequelae.

2. THE THEORY AND PRACTICE OF OBSTETRICS

Lectures and recitations, two hours a week in November, December and January, third year.

The mechanism and conduct of normal labor, with its complications; abortions.

3. **HOSPITAL WARD WORK** — PROFESSOR LEAVITT

Twice a week, from January 1st to May 1st, small sections of the third and fourth year classes will study the signs of pregnancy, pelvimetry, obstetric diagnosis, the puerperal state, the early care of infants, incubation, etc., in the maternity wards of the City and County Hospital, St. Paul.

4. **CLINICAL OBSTETRICS**

The study of and the participation in the conduct of two or more hospital deliveries in the fourth year under the direction of Professors Leavitt and Litzenberg. Also a number of confinements in maternities and private homes, conducted by Doctors Adair and Jeanette McLaren.

5. **MANIKIN DEMONSTRATIONS** — PROFESSOR LITZENBERG AND DR. ADAIR

Once a week during the third and fourth years the various positions, presentations and obstetric operations will be demonstrated by means of the manikin.

6 **RECITATIONS** — PROFESSORS LEAVITT AND LITZENBERG

One hour a week. Fourth year. first and second semesters

This course will be a review of the subject of practical obstetrics by recitations.

TEXT-BOOKS:

Hirst, Edgar, Williams, Jewett, Lusk, Peterson, and the American Text-Book of Obstetrics.

DEPARTMENT OF GYNECOLOGY

ALEXANDER J STONE, M.D., LL.D., Professor of Diseases of Women, and Chief of the Department of Gynecology.

AMOS W. ABBOTT, M.D., Clinical Professor of Diseases of Women.

JOHN J. ROTHROCK, A.M., M.D., Clinical Professor of Diseases of Women.

GEO. C. BARTON, M.D., Clinical Instructor in Gynecology.

ARTHUR E. BENJAMIN, M. D., Clinical Instructor in Gynecology.

HARRY P. RITCHIE, Ph.B., M.D., Clinical Instructor in Gynecology.

H. L. WILLIAMS, A.B., M.D., Clinical Instructor in Gynecology.

CONRSES OF INSTRUCTION

The course in the diseases of women consists of lectures, recitations, clinical instruction and the witness of operations upon the human subject, as they may offer.

1. **LECTURES AND RECITATIONS** — PROFESSOR STONE

Two hours per week, first semester, one hour a week, Fourth year, second semester

2. **CLINICAL COURSES AT THE CITY AND OTHER HOSPITALS IN MINNEAPOLIS AND ST. PAUL.**

Observations and examinations of patients, methods of examination, diagnosis and treatment.

Weekly clinics in Minneapolis hospitals, by Prof, Abbott, Dr. Benjamin and Dr. Williams.

Weekly clinics held in St. Joseph's Hospital, St. Paul, by Prof. Stone.

Weekly clinics held at the City and County Hospital, St. Paul, during January, February, and March, by Dr. Rothrock.

The above announcements represent the surgical work given in gynecology throughout the entire year. Every operation in this branch of surgery is presented in these clinics. Owing to the limited field within which this work must be done, the attempt is always made to divide the class into small sections. Daily clinics for small sections are held at the University and St. Paul Free Dispensaries by Drs. A. E. Benjamin, H. L. Williams, and J. L. Rothrock. This work is especially valuable since it brings the student into direct acquaintance with the patient. Individual instruction is given in history-taking, diagnosis, methods of examination, treatment and minor gynecology.

TEXT-BOOKS:

Dudley's Diseases of Women.
Reed's Text-book of Gynecology.
Kelly's Operative Gynecology.
Collateral Reading—Penrose, Gleist and Ashton.

DEPARTMENT OF EYE, EAR, NOSE AND THROAT DISEASE

FRANK C. TODD, M.D., Professor of Ophthalmology and Otology, and Chief of the Department.

WILLIAM R. MURRAY, A.B., M.D., Professor of Rhinology and Laryngology.

JOHN S. MACNIE, A.B., M.D., Clinical Professor in Ophthalmology and Otology.

ALBERT C. HEATH, M.D., Clinical Professor in Rhinology and Laryngology.

ROBERT A CAMBPELL, M.D., Clinical Instructor in Rhinology and Laryngology.

FRANK E. BURCH, M. D., Clinical Instructor in Ophthalmology and Otology.

CHAS. H. SPRATT B.S., M.D., Clinical Instructor in Ophthalmology and Otology.

E. H. PARKER, M.D., Clinical Instructor in Rhinology and Laryngology.

ROBERT A. CAMBPELL, M.D., Clinical Instructor in Rhinology and Laryngology.

J. A. WATSON, M. D., Clinical Instructor in Rhinology and Laryngology.

H. JOURNEAY WELLS, M.D., Clinical Instructor in Ophthalmology and Otology.

JOHN H. MORSE, B. A., M. D., Clinical Assistant in Ophthalmalogy and Otology.

E. R. BRAY, M.D., Clinical Assistant in Ophthalmology and Otology.

COURSES OF INSTRUCTION

The student, during the first two years, receives instruction in the anatomy and physiology of these organs in those departments, and the courses upon diseases of the eye, ear, nose and throat are given during the senior year, excepting that a certain amount of clinical work is provided during the third year.

The required work consists of a course of lectures and recitations and of dispensary and hospital clinics given in Minneapolis and St. Paul by a competent corps of instructors. Students are taught the technique of examination and the treatment of the common and important diseases. An elective course is also furnished in ophthalmoscopy.

1. **DISEASES OF THE EYE AND ITS APPENDAGES, REFRACTION AND ERRORS**
   Lectures, two hours a week, first semester, fourth year.
   PROFESSOR TODD
   Recitations covering this course of lectures nine hours during the first semester Fourth year DR. MACNIE

2. **DISEASES OF THE EAR**
   Lectures, nine hours during first semester, fourth year PROFESSOR TODD
   Recitations on this course · DR. MACNIE

3. **DISEASES OF THE NOSE AND THROAT** PROFESSOR MURRAY
   Lectures and recitations, two hours a week, second quarter, fourth year
   Pathology, diagnosis and treatment.

4. Clinical lectures on Eye, Ear, Nose and Throat operations at Northwestern Hospital Minneapolis, given every Thursday. Sections of Senior and Junior classes.
   PROFESSOR TODD

5. Clinical lectures and operations on Nose and Throat, given at Asbury and City Hospital, Minneapolis, every Saturday. Sections of Senior and Junior classes.
   PROFESSOR MURRAY

6. Clinical lectures and operations on Eye and Ear, given at Northwestern Hospital, Minneapolis, every Saturday. Sections of Senior and Junior classes.
   DR. SPRATT

7. Clinical instruction will be given at the University and the St. Paul Free Dispensaries in the diagnosis of diseases of the eye and ear; in the methods of examination in the use of instruments, including the ophthalmoscope, and in the treatment of eye and ear diseases, etc. Small sections daily. Fourth year.
   Diseases of eye and ear, Minneapolis DR. MACNIE AND DR. WELLS
   Diseases of the eye, St. Paul DR. BURCH

8. Clinical instruction will be given at the University and St. Paul Free Dispensary in the diagnosis of nose and throat diseases, in the methods of examination, use of instruments and treatment of these. Small sections daily. Diseases of the nose and throat, Minneapolis, PROFESSOR MURRAY, DR. CAMPBELL, DR. PARKER, DR. WATSON.
   St. Paul Two days a week, fourth and third year DR. HEATH

9. **OPHTHALMOSCOPY** **DR. MACNIE**

A practical course of instruction. Technique of ophthalmoscopy, with illustrations on models and patients, normal and abnormal cases, demonstrating diseases of the interior of the eye. This course elective in the senior year.

10. **INTUBATION** **DR. E. H. PARKER**

An elective course on intubation illustrated by work on the cadaver will be given to fourth year students. Class limited to six students.

TEXT BOOKS:

May, Diseases of the Eye.
Wood and Woodruff, Commoner Diseases of the Eye.
Fox's Diseases of the Eye.
Bacon's Diseases of the Ear.
Coakley's Diseases of the Nose and Throat.
Kyle's Diseases of the Nose and Throat.
Grayson's Diseases of the Nose and Throat.

Collateral Reading. Ballenger's Diseases of Ear, Nose and Throat, Posey and Wright's Diseases of the Ear, Nose and Throat.

DEPARTMENT OF NERVOUS AND MENTAL DISEASES

C. EUGENE RIGGS, A. M., M.D., Professor of Nervous and Mental Diseases, and Chief of the Department of Nervous and Mental Diseases.
WILILAM A. JONES, M.D., Professor of Nervous and Mental Diseases.
A. W. DUNNING, M.D., Clinical Professor of Nervous and Mental Diseases.
HALDOR SNEVE, M.D., Clinical Professor of Nervous and Mental Diseases.
A. S. HAMILTON, B.S., M.D., Instructor in Pathology of the Nervous System.
H. W. JONES, M.D., Clinical Instructor in Nervous and Mental Diseases.
CHARLES R. BALL, A.B., M.D., Clinical Instructor in Nervous and Mental Diseases.
A. E. LOBERG, M. D., Clinical Assistant in Nervous and Mental Diseases

COURSES OF INTRUCTION

The required courses of lectures and recitations and clinics in this department will be given in the fourth year. The courses relating to the anatomy, physiology and pathology of the nervous system are given by these departments in the first, second and third years. Instruction will be by recitations and the "case method." An elective course in electro-therapeutics will be offered in the fourth year.

NEUROLOGY **PROFESSORS RIGGS AND JONES** (alternating)
Two hours a week, twelve weeks. Fourth year, first semester
Lectures, recitations and demonstrations.

PSYCHIATRY **PROFESSORS RIGGS AND JONES** (Alternating)
Two hours a week, five weeks. Fourth year, first and second semesters
Lectures, recitations and demonstrations.

3. **ELECTRO-THERAPEUTICS** (elective) **DR. BALL**
Fourth year.

4. CLINICAL NEUROLOGY AND PSYCHIATRY PROFESSORS RIGGS AND JONES

Practical instruction will be given upon Thursdays and Saturdays, fourth year Clinics will be conducted in St. Paul, by Professor Riggs, Drs. Dunning and Ball, at the City and County Hospital, St. Luke's Hospital, St. Joseph's Hospital and the Free Dispensary; and in Minneapolis by Professor Jones, and Drs. H. W. Jones and Loberg, at the City Hospital, Asbury Hospital, St. Mary's Hospital and the University Free Dispensary.

TEXT-BOOKS:

Oppenheim's Diseases of the Nervous System.
Dana's Nervous Diseases.
Church and Peterson's Nervous and Mental Diseases.
Allan M. Starr's Nervous Diseases, Organic and Functional.
The Eye and Nervous System, Posey and Spiller.
Manual of Psychiatry, Dr. Fursac.
Text-book of Psychiatry, Leonardo Bianchi.
Practical Manual of Insanity, Brower and Bannister.
The Hygiene of Mind, T. S. Clouston.

Collateral Reading. Edinger's Anatomy of the Central Nervous System; Gordinier's Anatomy of the Central Nervous System. Gower's Diseases of the Nervous System.

THE HISTORY OF MEDICINE AND MEDICAL ETHICS

PROFESSOR BURNSIDE FOSTER

Two hours a week. Fourth year

A course of lectures is given on the history of medicine and of the medical profession from the earliest times, including accounts of the epoch-making discoveries in medicine, brief sketches of the lives of eminent physicians and an account of the great plagues in history.

MEDICAL JURISPRUDENCE

PROFESSOR SWEENEY

Two hours a week. Fourth year

A course of lectures and recitations, in the legal relations of medicine.

TEXT-BOOKS:

Taylor's Medical Jurisprudence.

Collateral Reading. Withaus' Principles of Forenesic Medicine and Toxicology; Wharton and Stille's Medical Jurisprudence; Reese's Medical Jurisprudence and Toxicology; Draper's Medical Jurisprudence.

SCHEDULE OF EXAMINATIONS FOR ADVANCED STANDING AND TO REMOVE CONDITIONS

September 7–11, 1909

Tuesday, Sept. 7, 9:00 a. m.	2:00 p. m.
I. Year.	I. Year Histology and Embryology, practical.
II. Year Histology and Embryology, practical.	II. Year General Pathology and Bacteriology, practical
III. Year Special Pathology and Bacteriology, practical.	III. Year Practical Pharmacy.
IV. Year by arrangement.	IV. Year by arrangement.
Wednesday, Sept. 8, 9:00 a. m.	2:00 p. m.
I. Year Physiology.	I. Year Histology and Embryology, written
II. Year Chemistry.	II. Year Histology and Embryology, written.
III. Year Principles of Surgery.	III. Year Surgery.
Thursday, Sept. 9, 9:00 a. m.	2:00 p. m.
I. Year Chemistry.	I. Year.
II. Year Physiology.	II. Year General Pathology and Bacteriology, written.
III. Year Practice of Medicine.	III. Year Special Pathology and Bacteriology, written.
Friday, Sept. 10, 9:00 a. m.	2:00 p. m.
I. Year Anatomy.	I. Year.
II. Year Anatomy.	II. Year Materia Medica and Pharmacology.
III. Year Surgical Anatomy.	III. Year Therapeutics.

Saturday, Sept. 11.

Examination for advanced standing and to remove conditions in the following third- and all fourth-year subjects will be held by *appointment* during September 7–11: Diseases of Children, Physical Diagnosis, all elective subjects, and all subjects not listed above. In all subjects not specifically scheduled, condition examinations must be arranged for not later than Sept. 7.

Students must register for examinations in dean's office at least twenty-four hours prior to any examination they may wish to take. See also under Rules, page 36 for regulation concerning unremoved conditions, etc.

Conditioned students will not be admitted to any examination without presenting receipt from the cashier for the examination fee, to the dean and obtaining entrance ticket.

MINNEAPOLIS HOSPITAL CLINICS

(For Dispensary Clinics see page 91.)

HOUR	SUBJECT	CLINICIAN	SERVICE
MONDAY			
2:15–3:15	Tuberculosis	Prof. Nippert	Thos. H. 3d q.
TUESDAY			
12:30–1:30	Jr.Phys.Diag.	Prof. Nootnagel	Clin. Building
WEDNESDAY			
12:30–1:30	Jr. Phys.Diag.	Dr. E. K. Green	Clin. Building
2:15–3:15	Tuberculosis	Dr. Cross	Thos. H. 3d q.
THURSDAY			
8:30–10:30	Eye and Ear	Prof. Todd	Nw. Hosp.
10:30-12:30	Gynecology	Dr. Benjamin	Nw. Hosp.
1:00-2:00	Medicine	Prof. Hunter	St. Barnabas
8:30-10:30	Medicine	Prof. Nootnagel	City
11:00-12:00	Nose & Throat	Prof. Murray	Ashbury
11:00-12:00	Nose & Throat	Dr. Watson	
1:00–2:00	Medicine	Prof. White	City
1:00–2:00	Medicine	Dr. Bradley	City
1:00-2:00	Medicine	Dr. Rees	City 3 mos.
8:30-10:30	Surgery	Prof. Sweetser	City
10:30-12:00	Medicine	Dr. Rees	City 3 mos.
10:30-12:00	Surgery	Prof. Mann	City 3 mos.
10:30-12:00	Contagious	Dr. Hart	City
1:00-2:00	Medicine	Prof. Head	Clin. Building
2:00-3:00	Dermatology	Prof. F. R. Wright	Clin. Building
2:00-3:00	Pediatrics	Dr. Sedgwick	City
2:00-3:00	Ner. & Ment.	Dr. H. W. Jones	City
2:30-3:30	Medicine	Prof. Head	Thos. H.
3:15-4:15	Ner. & Ment.	Prof. W. A. Jones	City
4:00-6:00	Autopsies	Prof. White or Prof. Corbett	City

FRIDAY

HOUR	SUBJECT	CLINICIAN	SERVICE
12:30-1:30	Jr. Phys.Diag.	Dr. Rees	Clin. Building

SATURDAY

8:30-10:30	Surgery	Prof. Dunsmoor	Swedish
10:30-12:00	Medicine	Prof. Nippert	City
1:00-2:30	Surgery	Prof. Mann	City 3 mos.
1:00-2:30	Medicine	Dr. Cross	City 3 mos.
2:30-3:30	Pediatrics	Dr. C. B. Wright	City 3 mos.
8:30-10:30	Medicine	Prof. Head	City
8:30-10:30	Medicine	Dr. Sheldon	City
10:30-12:00	Gynecology	Prof. Abbott or Dr. Williams	City
10:30-12:00	Gynecology	Dr. Barton	City
8:30-10:30	Contagious	Dr. Dart	City
1:00-2:25	Surgery	Dr. Farr	St. Mary's
1:00-2:00	Pediatrics	Dr. Dart	Clin. Building
2:00-3:00	Medicine	Dr. Sheldon	Clin. Building
2:15-3:15	Tuberculosis	Dr. Cross	Thos. Hosp. 1 & 2 q.
9:00-10:30	Surgery	Prof. Moore	Nw. Hosp.
10:30-12:00	Eye and Ear	Dr. Spratt	Nw. Hosp.
1:00-2:30	Medicine	Prof. Staples	City
2:30-3:30	Nerv. & Ment.	Dr. Hamilton	City
2:30-3:30	Obstetrics	Dr. Litzenberg	City
3:00-4:00	Orthopedics	Dr. Geist	Clin. Building
4:00-6:00	Autopsies	Prof. White or Prof. Corbett	City

Parturition Clinics throughout the year by Prof. Litzenberg, Dr. Adair, and their assistants for Seniors at City Hospital and in the Out-patient service.

NOTICE. Throughout the school year, clinics for each week are announced in advance by the publication of a weekly bulletin covering hospitals and dispensaries in the Twin Cities.

ST. PAUL CLINICS
THURSDAY

HOUR	SUBJECT	CLINICIAN	SERVICE
9:00-12:00	Surgery	Prof. Mac Laren	Entire Year, St. Luke Hosp.
9:00-12:00	Surgery	Prof. O'Brien	Entire Year, St. Joseph Hosp.
9:00-12:00	Orthopedics	Prof. Gillette	Entire Year, City Hosp.
10:15-12:00	Gynecology	Prof. Rothrock	After Jan. 1st, City Hosp.
1:30-3:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Prof. Colvin	After Jan. 1st, City Hosp.
1:30-3:00	Gen-Urin	Dr. Coon	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Goodrich	Oct. to Jan. Dispensary
1:30-3:00	Surgery	Dr. Ritchie	After Jan. 1st, Dispensary
1:30-3:00	Medicine	Dr. Gilfillan	Oct. to Jan. Dispensary
1:30-3:00	Medicine	Dr. Hall	After Jan. 1st, Dispensary
1:30-3:00	Pediatrics	Prof. Christison	Oct. to Jan. Dispensary
1:30-3:00	Ner. & Ment.	Dr. Dunning	Oct. to April Dispensary
1:30-3:00	Ner. & Ment.	Dr. Ball	After April 1st, Dispensary
1:30-3:00	Eye & Ear	Dr. Burch	Oct. to Jan. Dispensary
1:30-3:00	Nose & Throat	Dr. Heath	Oct. to May, Dispensary
3:00-4:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Senkler	After April 1st, City Hosp.
4:00-5:00	Medicine	Dr. Hoff	After April 1st, City Hosp.
4:00-5:00	Surgery	Dr. Ancker	After Jan. 1st, City Hosp.
4:00-5:00	Obstetrics	Prof. Leavitt	After Jan. 1st, City Hosp.
4:00-5:00	Pediatrics	Dr. Ramsey	After Jan. 1st, City Hosp.
4:00-5:00	Eye & Ear	Dr. Burch	After Jan. 1st, City Hosp.

SATURDAY

HOUR	SUBJECT	CLINICIAN	SERVICE
9:00-10:00	Ner. & Ment.	Prof. Riggs	After Jan. 1st, City Hosp.
10:00-12:00	Surgery	Prof. Rogers	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Dennis	After Jan. 1st, City Hosp.
1:30-3:00	Surgery	Dr. Goodrich	Oct. to Jan., Dispensary
1:30-3:00	Surgery	Dr. Ritchie	After Jan. 1st, Dispensary
1:30-3:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
1:30-3:00	Medicine	Dr. Hall	After Jan. 1st, Dispensary
1:30-3:00	Ner. & Ment.	Dr. Dunning	Oct. to April, Dispensary
1:30-3:00	Ner. & Ment.	Dr. Ball	After April 1st, Dispensary
1:30-3:00	Pediatrics	Dr. McCloud	After Jan. 1st, Dispensary
1:30-3:00	Dermatology	Prof. Foster	Entire year, Dispensary.
3:00-4:00	Medicine	Prof. Greene	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Abbott	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Prof. Senkler	After Jan. 1st, City Hosp.
4:00-5:00	Medicine	Dr. Hoff	After Jan. 1st, City Hosp.
4:00-5:00	Surgery	Dr. Ancker	After Jan. 1st, City Hosp.
4:00-5:00	Obstetrics	Prof. Leavitt	After Jan. 1st, City Hosp.
4:00-5:00	Pediatrics	Dr. Ramsey	After Jan. 1st, City Hosp.
	Surgery	Prof. Shimonek	Service to be announced later.
	Medicine	Dr. Stumn	
	Gen-Urin	Dr. Armstrong	
	Gen-Urin	Dr. Cook	

Gynecology. Prof. Stone at St. Joseph Hospital weekly.

Gynecology. Prof. Rothrock and Dr. H. P. Ritchie, daily clinic at Dispensary. (One student.) 1:00 to 2:00.

Parturition clinics throughout the year at City Hospital, Maternities, and Dispensary out-service with Prof. Leavitt and Dr. Jeanette McLaren. (One to five students.)

NOTICE: Throughout the school year, clinics for each week are announced in advance by the publication of a weekly bulletin covering hospitals and dispensaries in the Twin Cities.

DISPENSARY CLINICS

At the University Clinical Building, Minneapolis

First and Second Semesters, 1909-1910

Mon. and Thurs.	1:00-3:00	Medicine	Prof. Head, Drs. Aurand and Hynes
"	" "	Surgery	Dr. Condit
"	" "	Nose and Throat	Dr. Campbell
Mon., Wed. and Friday	" "	Pediatrics	Dr. C. B. Wright
"	" "	Eye and Ear	Dr. Macnie
"	" "	Skin and Venereal	Dr. F. R. Wright
"	" "	Nervous and Mental	Dr. Hamilton
"	" "	Gynecology	Dr. Benjamin
"	" "	Orthopedics	Dr. Geist
Daily	" "	Clin. and Microscopy	Dr. Ulrich
Tues. and Friday	" "	Medicine	Dr. Rees Dr. Bouman
"	" "	Surgery	Dr. Law
"	" "	Nose and Throat	Prof. Murray
Tues., Thurs. and Saturday	" "	Pediatrics	Dr. Dart
"	" "	Eye and Ear	Dr. Wells
"	" "	Skin and Venereal	Dr. Sweitzer
"	" "	Gynecology	Dr. Williams
"	" "	Nervous and Mental	Prof. W. A. Jones or Dr. Loberg
Wednesday	" "	Medicine	Prof. Nippert Dr. Green
Wed. and Sat.	" "	Surgery	Prof. Mann Dr. Goehrs
"	" "	Nose and Throat	Dr. Parker

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THE SCHOOL FOR NURSES

THE TRAINING SCHOOL FOR NURSES

The Board of Regents of the University of Minnesota has directed the organization of The Training School for Nurses, under the control of the faculty of the College of Medicine and Surgery and in affiliation with the University Hospital service.

It is the purpose of the faculty to conduct the school, not merely for the attainment of a suitable hospital nursing service, but as one in which the nurse can obtain a most thorough scientific training. It will endeavor to make the school a stepping-stone to the advancement of the profession of nursing in the northwest.

While its requirements for admission will serve as reasonable tests of fitness, it wishes to attract a class of refined, educated and earnest women to its matriculation.

The entire course of study will cover a period of three years. The first six months will be devoted to preliminary courses of instruction under a special matriculation fee. These courses, for a period of four months, will be conducted in several of the departments of the College of Medicine and Surgery, by a corps of faculty instructors, with the assistance of the Superintendent of the Training School. Examinations will be held at the close of this four months work and must be satisfactorily passed in order to permit of further advancement.

Following these courses, admission will be had to the hospital and the ensuing two months will be given to practical training in hospital service and economics, and during this time the student will be given no responsibility for the care of patients Nurses will, then, upon successfully completing this preliminary course and with due consideration to their general fitness, be admitted to the full hospital service. In the succeeding two and a half years, a graded system of hospital education will be conducted, during which the student will serve in the wards, dispensaries, laboratories, dressing-rooms and operating-rooms, in succession or alternation. Courses of lectures and demonstrations will be given by members of the faculty and by the Superintendent in each year, and, at its close, examinations will be conducted in both practical and didactic work.

At the close of the three years' course of training, the successful candidate for graduation will be presented to the Faculty and, upon its recommendation, she will receive from the Board of University Regents a nurse's diploma. A certificate will be issued, at the close of each years' work, to the successful student, by the Dean of the College, but applicants will not be admitted to advanced standing from other schools until a better determination can be made of a standard of minimal requirements in each year than is, at present, possible.

Graduate nurses will be eligible, under prescribed regulations and competitive examination, for positions in the hospital service as head nurses.

Graduates or undergraduates of other hospital training schools will be admitted, upon certificate of good standing from their respective schools, and upon payment of the usual matriculation fee, to the four months preliminary course of training. After regular attendance upon this course and upon passing the examinations proper to the course, certificates of its satisfactory completion will be granted.

CORPS OF INSTRUCTORS OF THE TRAINING SCHOOL FOR NURSES.

PRELIMINARY COURSE

ANATOMY, ETC.
    Thomas G. Lee, B.S., M.D.
    Charles A. Erdmann, M.D.
PHYSIOLOGY
    Richard Olding Beard, M.D.
    F. H. Scott, M.A., M.B., Ph.D.
    M. R. Wilcox, M.D.
    Julius Parker Sedgwick, B.S., M.D.
CHEMISTRY
    George B. Frankforter, M.A., Ph.D.
MATERIA MEDICA AND PHARMACOLOGY
    E. D. Brown, Phm.D., M.D.
    CHAS. F. DIGHT, M.D.
BACTERIOLOGY AND HYGIENE
    Frank Fairchild Wesbrook, M.A., M.D., C.M., Dean
PUBLIC HEALTH
    Henry Martyn Bracken, M.D., L.R.C.S. (Edin)
ENGLISH
    Helen Griffith, B.A.
PHYSICAL CULTURE
    Anna M. Butner, Director
HOSPITAL AND HOUSEHOLD ECONOMICS
    Members of the Faculty and the Superintendent of Training School

UNDERGRADUATE COURSES

MEDICINE, PHYSICAL DIAGNOSIS, ETC.
John W. Bell, M.D.
Charles H. Hunter, A.M., M.D.
Henry L. Staples, A.M., M.D.
Thomas S. Roberts, M.D.
S. Marx White, B.S., M.D.
J. G. Cross, M.D.
Geo. Douglas Head. B.S., M.D.
Peder A. Hoff, M.D.
W. D. Sheldon, M.D.

SURGERY
James E. Moore, M.D.
Frederick A. Dunsmoor, M.D.
J. Clark Stewart, B.S., M.D.
Arthur J. Gillette, M. D.
Arthur T. Mann, B.S., M.D.
Alexander R. Colvin, M. D.

OBSTETRICS
A. B. Cates, A.M., M.D.
Fred E. Leavitt, M.D.
J. C. Litzenberg, B.S , M.D.

NERVOUS AND MENTAL DISEASES
W. A. Jones, M.D.

EAR AND EYE, NOSE AND THROAT DISEASES
Frank C. Todd, M.D.
William R. Murray, A.B., M.D.

DISEASES OF WOMEN
Amos W. Abbott, M.D.
A. E. Benjamin, M.D.

THERAPEUTICS
E. D. Brown, Phm.D., M.D.

PHYSIOLOGIC CHEMISTRY, HYGIENE (PERSONAL) AND DIETETICS
Richard Olding Beard, M.D.
Julius Parker Sedgwick, B.S., M.D.
Bertha Erdmann, R. N. the Superintendent of the Training School

HOSPITAL ADMINISTRATION
Arthur B. Ancker, M. D.

SOCIAL ECONOMICS IN RELATION TO NURSING
John H. Gray, Ph.D.

HOSPITAL ECONOMICS AND PRINCIPLES OF NURSING

Bertha Erdmann, R.N., Superintendent of Training School, and member of the Faculty

CLINICAL FACILITIES

All of the clinical facilities of the State of Minnesota are now available, all of the medical interests of the state are harmonized, and the highest standards in medical education and development are assured.

The present medical group of buildings is located on the University campus overlooking the Mississippi River and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all of the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the College of Medicine and Surgery, the gift of the late Dr. A. F. and Mrs. Elliott and Mr. Walter J. Trask, of Los Angeles, Cal., to which an appropriation by the Legislature has been added, is in process of construction at a cost of about $155,000.

The Legislature, in 1909, appropriated $440,000 for the erection of buildings for the College of Medicine and Surgery as follows: $200,000 for an Institute of Anatomy, which will provide for all varieties of anatomical work, both gross and microscopic; $200,000 for a Medical Science building which will house the Department of Physiology and Pharmacology, and temporarily provide space for the didactic teaching in Surgery, Medicine and Obstetrics; the sum of $40,000 was granted to be added to the Elliot bequest of $115,000 to permit of the erection of a larger hospital building.

In connection with the extension of the University, a new medical campus site has been selected south of Washington Avenue and on the high bluffs overlooking the Mississippi, upon which the above laboratory and hospital buildings of the College of Medicine and Su gery will be located. Eventually, other laboratory and hospital buildings will be added to this group, to be followed by the relinquishment, for other purposes, of all of the present buildings now occupied by the department.

The Elliot Hospital is located on the above site overlooking the river and will form a part of the medical group of buildings. This hospital site was purchased by means of a gift of $50,000, from generous citizens of Minneapolis, to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which will constitute the medical campus has already been made by the last two state legislative appropriations of $800,000 for campus extension.

The College of Medicine and Surgery is in intimate relationship with the numerous hospitals, infirmaries and dispensaries of the Twin Cities and also with the medical departments of the various state correctional and charitable institutions for which Minnesota is so justly noted. St. Mary's Hospital, Rochester; St. Mary's Hospital, Duluth, and the Duluth Health Department are in close affiliation with the college through their laboratories.

HOSPITALS

The Twin Cities, with a population of over 500,000, through their several hospitals, afford clinical service to the extent of 1,620 beds. During the last year, important additions have been made to almost every hospital in the two cities, some of them having doubled their capacity.

The hospital facilities of the University are thus exceptionally good, since they are not limited to one large amphitheatre, where but a few students can closely observe diagnostic and surgical methods, but are divided among a number of hospitals where the various professors care for the clinical cases. This makes it possible to divide the classes into small sections, so that each student has equal opportunities of observation and is in close touch with both teacher and patient.

The University Hospital, pending the completion of the Elliott Hospital, occupies four buildings on the University campus, two as pavilions containing 44 beds; the others serve as the residence quarters of The Training School for Nurses.

These University Hospital pavilions constitute a strictly charity hospital, no pay patients being received. The indigent sick, from any part of the state, on proper medical certification, will be received in these wards.

St. Paul City and County Hospital has a capacity of 400 beds and is the largest and most complete of its kind in the northwest. Many of the members of its staff are on the staff of this college and its entire clinical facilities are at the disposal of the college. It enters over 2,000 patients annually, a large proportion of whom are of the emergency order or are suffering from acute disease. The opportunities for bedside instruction are very great and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A recent and thoroughly modern fireproof pavilion for contagious diseases is provided, where the students have unexcelled opportunities to study diphtheria, scarlatina, erysipelas, etc. A separate building is provided for midwifery, and senior students see labor cases under the personal supervision of the professor or instructor in obstetrics.

The orthopedic department contains a large number of crippled and deformed children, and houses the State Hospital for Crippled and Deformed Children. All of this work is under the control of the Professor of Orthopedic Surgery of this college.

The City Hospital, Minneapolis, places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital with splendid equipment and has a capacity of 200 beds. During the year 1908, 1,836 patients were treated in the hospital, and 2,450 patients in the out-patient department and hospital dispensary. A new administration building has just been completed by the city at a cost of $55,000, and a pavilion for the care of the incurable is planned for early completion. A modern, newly-erected contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases under the direction of the professor of diseases of children. In the City Hospital, bedside and amphitheatre medical and surgical clinics are conducted daily throughout the year by members of the faculty. Clinics in diseases of the skin, nervous diseases, obstetrics, etc., are likewise given in the hospital throughout the school year. A special feature is made of medical bedside clinics in the wards of the hospital to small sections of senior students, conducted by members of the faculty.

Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building only a portion of which is as yet occupied. It has a capacity of 160 beds, and, when the building is entirely completed, the hospital will have a capacity of nearly 350 beds. Many members of the faculty are on the staff of the hospital and give clinics.

St. Joseph's Hospital, St. Paul, with 130 beds and one of the finest amphitheatres, with every modern device, contributes largely to the clinical instruction. Members of the faculty are on the staff and give clinics there to the students.

Northwestern Hospital, Minneapolis, affords splendid surgical material, available to this college alone. Semi-weekly clinics in surgery are given in its amphitheatre and in three operating rooms and wards, by members of the faculty. It has a capacity of 100 beds and during 1908 treated 1,000 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical clinics. Clinics of this college are held in this hospital by many members of its staff who are on the college faculty. Two operating rooms, with conveniences for students, give unusual facilities and a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 115 beds, is housed in a newly-constructed modern building and members of this faculty exclusively utilize the material of the hospital for teaching purposes. During the year 1908, 1,456 patients were treated.

St. Barnabas' Hospital, Minneapolis, with a capacity of 100 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the preceding year 1,617 patients were treated at this hospital.

St.Mary's Hospital, Minneapolis, also furnishes clinical material for the University. The hospital is located directly across the Mississippi River from the new University Hospital. It has a capacity of 100 beds and treated 1,200 patients during the last year.

The Norwegian Hospital, Minneapolis, has been erected immediately across the river from the new University Hospital. Among other things, it provides a sanatorium, now completed, for the treatment of tuberculosis.

DISPENSARIES

Students of The Training School will be given suitable opportunities for clinical observation and nurses may be assigned, as occasion offers, to indoor and outdoor dispensary service.

In its clinical instruction the medical department makes use of two well-organized free dispensaries, each having a large outdoor service. The University clinical building is located across the river from the medical department proper at 1810 Washington Ave. S. It is a three-story building, 40x150 feet, situated in a thickly populated part of Minneapolis, and receives 2,500 new patients per year, or an average of 33 daily. The staff is composed exclusively of the members of the faculty and their assistants and is organized under a chief of staff..

The St. Paul Free Dispensary is centrally located in a twenty-room building, and its clinical service is wholly under the control of the staff of University instructors. Forty patients daily are treated throughout the year.

LIBRARY OF MEDICAL DEPARTMENT

THOMAS G. LEE, B.S., M.D., LIBRARIAN

The medical library consists of the following collections: The general clinical library, the libraries of the colleges of dentistry and pharmacy, the departmental libraries of pathology and bacteriology, histology and embryology, anatomy, and physiology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, etc., and about 175 current periodicals. In addition to the above, the libraries of the State Board of Health, of Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medical Society with some 7,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications.

The general University library contains some 115,000 bound volumes, 30,000 unbound volumes and pamphlets, and several hundred current periodicals. The public libraries of Minneapolis, with 160,000 volumes, and of St. Paul, with some 90,000 volumes, the State Historical Library of 85,000 volumes, and the State Library of 59,000 volumes, the Library of the Minnesota Academy of Natural Sciences of some 12,000 titles, place before the student the greater part of the important literature relating to all branches of the physical and natural sciences, as well as works of general culture and those pertaining particularly to medicine. All of these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition, by the department of histology and embryology, through the generosity of Alfred F., John S. and Charles C. Pillsbury, of a large portion of the working library of the late Professor William His, of Leipzig, containing about 8,500 titles and representing some 2,500 authors.

LABORATORY BUILDINGS AND EQUIPMENT

Over $500,000.00 is already invested in the laboratories and equipment of this college, exclusive of site.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from a close association with the other University departments, such as the general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Millard Hall, a large,four story brown stone and cream brick building, (65x125 ft.) the oldest of any in the group, contains a faculty room, a large amphitheatre and lecture rooms, library and reading rooms of the department, together with the laboratory of pharmacology and materia medica. In addition, the College of Dentistry is temporarily provided with rooms.

The Medical Science Building, a large, four-story, brick building, (75x150 ft.) is especially designed for laboratories. The building houses the department of histology and embryology and the department of physiology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of histology and embryology occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south wing and the center of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.) constitutes the headquarters of the School of

Chemistry. The laboratory of medical chemistry is a one-story, brick building devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, basement building.

The Institute of Public Health and Pathology is the newest building of any in the Medical Quadrangle.

THE COURSE OF TRAINING

REQUIREMENTS FOR ADMISSION

Applicants for admission to the Training School for Nurses must present application in writing to the Dean of the College of Medicine and Surgery, by whom they will be referred to the Faculty Committee in charge. Such applications will be received at the opening of each semester. They must state the age and residence of the applicant and must be accompanied by credentials showing the completion of, at least, a four years' High School course of study. While a high school diploma will be a prerequisite of admission, preference will be given to women of superior preliminary training. Applicants must not be less than twenty, nor more than thirty-five years of age. They must meet the Committee in person. They must present a good physique and must submit satisfactory evidence to the Committee of physical and mental fitness and of good character.

All applicants matriculated will be required to take the preliminary course of instruction and must pass the examinations at its close successfully. This period will be one, not only of preliminary training, but of probation, and the Faculty will reserve the right to pass upon the general fitness of the student to enter the hospital service at the close of that time.

FEES AND TERMS

A fee of twenty-five dollars ($25.00) will be charged upon admission to the preliminary course of instruction, and will be payable at the office of the University Cashier.

A deposit of three dollars will be required to cover loss or breakage of apparatus used by the student in the laboratories, returnable at the close of the preliminary course, less the cost of apparatus missing or destroyed.

During the preliminary course, the student will provide for her own board and lodging, text-books and stationary.

No fees will be charged during the remaining two and one-half years of the training course. After their admission to the hospital, the students will be expected to reside at the Nurses' Home, where comfortable rooms, board and laundry, together with hospital uniforms, will be provided for them at the expense of the University. Clothing, other than the hospital uniform-dress, they will provide for themselves and in character and sufficiency of supply it must conform to the hospital regulations.

A vacation of two weeks will be allotted, in succession, to each nurse in each year, at her own living expense.

Graduates of other Training Schools for Nurses, in good standing, or matriculants of these schools, having the required preliminary qualifications, will be admitted to the preliminary course of instruction, upon the conditions of entrance cited above and upon payment of the prescribed fee.

Upon successfully passing the examinations provided in this course, they will be granted a certificate of satisfactory attendance upon and proficiency in such work.

PLAN OF INSTRUCTION

The entire course of instruction in The Training School for Nurses will cover a period of three years and, successfully pursued, in conformity with the rules and regulations of the hospital service, will lead up to the degree of Graduate in Nursing, which will be conferred, upon recommendation of the Faculty, by the Board of Regents of The University of Minnesota.

The first half of the first year will be devoted to preliminary and probational courses of instruction. The first four months of study will be conducted in the lecture-rooms and laboratories of the college of Medicine and Surgery; the student being non-resident during that time. In the succeeding two months, completing the first half-year, she will be in hospital residence and engaged in general hospital training, but will be assigned to no definite hospital service.

In the last half of the first year and the first half of the second year she will be assigned to duty and will receive instruction in the men's and women's medical and surgical wards of the hospital, and in the diet-kitchens.

In the second half of the second year and throughout the third year, she will be assigned to special duty in the obstetrical, gynecological, orthopedic and children's wards; in the operating and anesthetic rooms and in special departments of practice.

The practical work of each year will be accompanied by courses of lectures and demonstrations, conducted by the Superintendent of Nurses and by members of the Faculty, upon phases of each department of practice with which the nurse is concerned, and these courses will be the subjects of examination at the close of each semester.

PRELIMINARY COURSES

ANATOMY

A course of lectures, recitations, demonstrations and laboratory exercises; four hours a week, for four months, including:

1 The study of the general properties of the tissue-cell; of the development of the human embryo; and of the several types of tissue.

2 The osseous system; composition, function, growth and repair of bone; the skeleton and its component parts; the structure and function of joints, etc.

3 The muscular system; the structure and relation of the muscles, tendons, fasciae, etc.

4 The circulatory system; including the heart and the blood and lymph channels.

5 The respiratory system; the lungs and their appendages.

6 The excretory system, the skin, kidneys, ureters and bladder.

7 The nervous system; the special sense organs; the central and peripheral mechanisms.

8 The reproductive system; the organs of generation, male and female.

PHYSIOLOGY

A course of lectures, demonstrations and laboratory exercises, accompanied by oral and written recitations; four hours a week, four months.

The course will include the study of the physiologic components of the animal body; of the nutritive media; of the vascular mechanisms; of the respiratory, digestive, secretory, metabolic and eliminative functions; and of the physiology of the nervous system in general.

CHEMISTRY

Lectures, recitations and laboratory exercises, two hours a week, four months.

This course will give the student a brief study of the general conditions of matter from the chemical standpoint; of chemical, as distinguished from physical changes; of the fundamental laws of chemistry; of the most important chemical elements; of water, physically and chemically considered; of the law of Mass Action, particularly as applied to medicine; of the elements of the carbon compounds and particularly of those which are of especial interest to the nurse, as disinfectants, toxic and antifebrile substances.

MATERIA MEDICA AND PHARMACOLOGY

A course of lectures, demonstrations and recitations, two hours a week, for four months.

The following topics will be discussed: The history and uses of drugs in the treatment of disease; the definitions of terms used to designate the different branches under which drugs are specifically studied; the classification of drugs with reference to origin; to pharmaceutic preparation and to physiologic action; the terms used in such classifications; the common and metric systems of weights and measures; a comparison with popular measures; the definitions and methods of preparing pharmaceutic preparations; the more important plant constituents, such as alkaloids, glucosides, etc.

The course will also include a study of methods of administering drugs; of rules of dosage for children; of rules governing dosage from standpoint both of patient and of drug action; a discussion of the more important drugs of vegetable, animal and inorganic origin, in turn; of the synthetic remedies and of cathartics, anesthetics and poisons and their antidotes.

BACTERIOLOGY

A course of lectures, demonstrations and recitations, three hours a week for four months, dealing with the science of bacteriology, in its practical relations to nursing; discussing, especially, the relations of this science and that of micro-zoology to disease and to protective measures; the life history of important bacteria and protozoa; favorable and unfavorable conditions of bacterial and parasitic growth; the fate of the pathogenic bacteria outside the body; the general principles of disease transmission; the role of the well individual as a carrier of infection; the conditions of asepsis and immunity in the nurse; the media and agency of infection, air, contact, water, food, milk, vomites, excreta, utensils; insects and vermin as media of infection or hosts of germs; methods of destruction of bacteria; the effects of physical and chemical agents; the practical details of hospital isolation.

PUBLIC HEALTH

A course of lectures, reading and recitations, one hour each week for four months, devoted to the discussion of the legal phases of public health questions in their relation to the profession of nursing; the relation and contribution of the nurse to vital statistics; the details of registration and inspection; the municipal and state control of contagious or communicable disease; the diseases susceptible of sanitary control, viz.: small pox, chicken pox, measles, scarlet fever, mumps, whooping cough, diphtheria, itch, pediculosis, typhoid, .tuberculosis; the agencies of control, vaccination, isolation, quarantine, etc.; the principles of disinfection, of rooms, clothing, bedding and persons; school inspection and hygiene; district nursing.

ENGLISH

A course of recitations and reading and written exercises, one hour a week for four months, in language.

Study and practice work in the construction and use of the sentence; in paragraphing; the writing of statements, synopses, reports, etc., correspondence, and in voice training and reading.

PRINCIPLES OF NURSING

A course of lectures, conducted by members of the Faculty and by the Superintendent of the Training School, upon the personal and professional needs of the nurse and upon the conduct of her professional relations. The subject matter of this course will be arranged as follows:

a. THE PERSONAL STATUS OF THE NURSE

Personal hygiene: dietary; ventilation; bathing; special items of toilet; exercise; clothing; hours of work; recreation; sleep; disease immunity.

The professional outfit and equipment of the nurses. Uniform; details of personal protection and asepsis. Necessary armamentarium.

b. THE ETHICS AND ETIQUETTE OF NURSING

Relations to hospital and hospital officials; conditions of hospital regulation and discipline.

Relations to the medical profession and the staff.

Relations to the profession of nursing and to fellow nurses.

Relations to the patient; to the patient's family; to hospital and household domestics; to hospital visitors.

Relation to society in general.

PHYSICAL CULTURE

A course of physical exercises, conducted for two hours in each week, for the period of four months, for the physical development of the student, consisting of calisthenics, systematic work with light apparatus and exercises especially directed to the training of the nurse in the adaptation of her movements to the best results in her practical work.

This course is not designed for the instruction of the nurse in physical exercises, as a means of treatment, that feature of her training being reserved to a later part of the hospital curriculum.

HOSPITAL AND HOUSEHOLD ECONOMICS

This course will be introductory to the admission of the student to hospital service and will be conducted during the entire six months of preliminary work. It will deal with the general principles of hospital and household economics applied to the practice of nursing.

It will include the study of the economics of the hospital, as a whole, and in its several working units; the equipment and operation of various wards; the conduct of general and special kitchens; the methods of food serving; the discussion of foods and food values, of food composition, selection and preparation; and of food adulteration.

It will deal with the general duties of the nurse in the service of the wards and will include laboratory and dietary exercises and demonstrations. The detail of the work follows:

a. THE GENERAL EQUIPMENT AND FURNISHING OF HOSPITAL

The general halls.
The linen room; its equipment.
The laundry.
The general kitchen; the ward kitchen; the diet kitchen.
The operating rooms; the anesthesia rooms; the surgical supply rooms.
The hospital pharmacy; the drug closet.
The hospital laboratories.
The toilet rooms and their equipment.
The hospital records; method of keeping order-books; the case records; chart making; fulfillment and record of orders.

b. THE GENERAL HOSPITAL WARD. Its equipment; standard linen-list; cost of ward maintenance; care of ward.

c. THE ISOLATION WARD. Its purposes; special equipment and care.

d. THE INDIVIDUAL WARD; or private room. Its average cost of maintenance; its equipment; its personelle.

The care of patients' room; cleanliness, light, ventilation, disinfection; care of bed and bed-linen; care of clothing; general toilet of patient; mechanical appliances of the sick-room.

e. THE KITCHEN; location; equipment. Stove, ranges, heaters, cookers, etc.

Fuels; relative values; refrigerators; their care and uses; store closets; kitchen utensils; hardware; linen.

f. THE PANTRY; its equipment. China: form and adaptation to use.
Cutlery; silver, utensils of service.
Table and trays; tray linens; tray serving.
The esthetics of food service.

g. FOODS; their definition; classes; form.
Food values; economic, nutritive, digestive, metabolic, esthetic.
Study of food composition; energy values; caloric supply adapted to age, sex, weight, condition and occupation.
Selection of Dietaries with reference to values; market conditions.
Balanced dietaries.
Composition of foods; values.

h. PREPARATION OF FOODS.
Methods of cooking in detail.
Effect on food values; percentage of loss.
Treatment of various classes of foods.

Treatment of typical foods.
Enhancement of food values.
Mechanical methods of preparation.
Raw foods.

f. FOOD ADULTERATION AND DETERIORATION. Bacterial decomposition.
Food storage, Food preservation.
Types of adulteration.
Dilution of values.
Substitution.
Preservation and preservatives.

HOSPITAL TRAINING

Students who have successfully completed the preliminary courses of the first six months, will be regularly entered in the hospital service. In addition to their hospital duties, they will attend courses of lectures, demonstrations and recitations upon subjects in general medicine and surgery and in special branches of practice related to their professional work. These courses will also include the study of practical dietetics and advanced problems in household and hospital economics and in the general principles of nursing. The detail of these courses follows:

UNDERGRADUATE COURSES OF STUDY

HYGIENE

a. RESPIRATORY NEEDS. Oxygen supply; quantity; uses; waste-removal; relations of CO2 to air pollution; causes of pollution; Requirements of ventilation; fresh air inlets; distribution; foul air outlets. Relations to heating. Influences of climate in ventilation.

b. WATER. Quantity required; relation to age, growth, sex, etc. Relations to food supply. Purity of drinking water; temperature, etc., Purification of drinking water in the household. Care of water containers.

c. FOODS. The principles of food selection; relation to content; relation to use. Caloric values of foods. Caloric needs with relation to age, sex, occupation, climate; in illness and in convalescence. Method of calculation.

The market values of food. Food selection with reference to its commercial forms. Study of market supplies. Food values as related to food preparation.

d. BEVERAGES. Their food values. Forms in ordinary use. Their preparation; other than food values; temperature. Combination of foods and beverages.

e. STIMULANTS. Their food values; physiological action; limits of use; relation to habit; conditions of employment; combination with foods; influence upon digestion. Types of stimulants; principles of choice.

f. BATHS AN · BATHING. Types of baths. Methods of administration. Classification by temperature. Physiological effects; therapeutic influence.

g. EXERCISE; its physiologic influence. Relation to occupation. Forms of exercise, active and passive.

h. CLOTHING. Classification according to material; to use. Qualities of clothing in relation to use; to age, sex, climate, occupation. The care of clothing.

BACTERIOLOGY

a. RELATIONS OF BACTERIOLOGY TO THE PERSONAL HYGIENE OF THE NURSE. Principles of personal cleanliness; personal clothing. Personal asepsis and antisepsis.

b. RELATIONS OF BACTERIOLOGY TO GENERAL DUTIES OF THE NURSE. Bacterial precautions in service.

c. RELATIONS OF BACTERIOLOGY TO THE CARE OF THE PATIENT; the patient's clothing; the patient's environment.

THERAPEUTICS

a. MEDICINES; their methods of administration; periods of repetitional dosage; cumulative tendencies.

b. CLASSIFICATION OF DRUGS THERAPEUTICALLY. Choice of agents.

c. POISONS AND THEIR ANTIDOTES.

d. DOSAGE; measures; quantities; effect of repetition.

MEDICINE

a GENERAL PRINCIPLES OF NURSING. Considerations of age, sex, occupations; character of disease; its duration; the history of the patient; the study of idiosyncrasy. The duty of the nurse in the general conduct of cases; the detail of orders; the treatment of emergencies.

b. CASE RECORDS. The study of case history. Methods of case recording. The items of record: temperature; pulse; respiration, etc. Observation and interpretation of symptoms.

c. THE GENERAL PRINCIPLES OF TREATMENT. The dietary of disease in general. The uses of water. The value of oxygen; ventilation; open air treatment. The regulation of light; the value of sun exposure. The temperature of the patient's apartment. Special aids to regulation of body temperature.
The value of exercise; active and passive. Massage; Swedish movements.
The use of baths. Methods of bathing. The care of the skin, hair, mouth, teeth.

d. THE NURSING OF THE NEW BORN. The physiology of birth. Infant temperature; tendencies to heat loss. Care of premature infants. Incubation. Incubators.
Treatment of skin of new-born; care of eyes; nose; ears; mouth; umbilicus; breasts; genitals.
Conditions of infant bathing.
Clothing of new-born; protection from light, etc.
Water-feeding. Feeding the new-born.
Diseases of the new-born. Ophthalmia neonatorum.
Jaundice. Trismus. Cyanosis. Convulsions. Melena.

e. THE NURSING OF INFANCY.

(1) Infant-feeding. Study of the human milk. The metabolism of the mammary-gland. Nutrition of the mother with reference to nursing. Causes of impairment of lactation. Hygiene of nursing. Care of the nursing breast. Quantity and quality of breast-milk. Intervals of nursing. Sleep requirements. Caloric needs of infancy. Determination of nutrition by weight. Tables of weight increase. Milk analysis. Supplementary feeding. Substitution of human milk. Artificial food supplies. Relation to period of infancy. Rate of digestion of substitutive food compared with human milk. Principles of infant feeding following lactation. Infant digestion. Dietaries of later infancy. Manufactured foods. Water-supply. Care of utensils of feeding. Care of foodstuffs.

(2) Infant bathing; form and temperature of baths. Care of infant skin. Toilet preparations.

(3) Infant clothing. Study of ideal wardrobes; materials of clothing; adaptation to season; cleanliness and ventilation of clothing.

(4) The excreta of infancy. The output from the skin. Urinary output; quality; quantity. The foecal debris; character of stools; evidences and causes of abnormality.

(5) The milk-teeth; order of irruption; disorders of teething period.

f. THE NURSING OF INFANTILE DISEASES.

General management. Pulse, temperature and respiration of infancy. Nutritional disorders: their relation to food and feeding. Marasmus; scorbutus; rachitis; cholemia; stomatitis. Gastro-enteric catarrh. Gastro-intestinal disorders. Repiratory disorders. Treatment of contagious diseases in infancy. Tuberculosis of infancy; tuberculous bone diseases; tuberculous meningitis. Specific disease in infancy. Parasitic disorders in infancy. Infantile neuroses.

g. THE NURSING OF CHILDHOOD.

General management of children in disease. Hygiene of childhood. The feeding of childhood. Conditions of growth. Sleep requirements. Conditions of temperature, pulse and respiration; oxygen supply and CO2 output Special tendencies to disorder in childhood. Digestive disorders; digestiveeflex.es; tendency to skin reflexes; to fever; to delirium. Management of fright; delirium; fever; skin disorders; sleep induction. Selection of food in disease during childhood. Administration of food in diseases of childhood. Administration of medicines. Study and care of the excreta in childhood.

h. THE DISEASES OF CHILDHOOD.

Care of contagious diseases. Principles of isolation. Disinfection of persons; clothing; bedding; furnishings; excreta; utensils, etc. Degrees of contagion; contagious principles; their control. Limitations of quarantine. Preventive measures. The nursing of scarlet fever; measles; mumps; whooping-cough; chicken-pox; small-pox; diphtheria; cholera; dysentery. General disorders of childhood. Special features of disease in childhood.

The care of continued fevers; typhoid fever; typhus fever; yellow fever. The care of malarial fevers; of acute rheumatic fever; of epidemic cerebro-spinal meningitis. The care of contagious disorders in adult life; small-pox; Asiatic cholera; amebic dysentery; pneumonia; pleurisy; bronchitis; etc. The care of nutritional disorders; Brights' disease; diabetes; rheumatoid arthritis; lithemia; pernicious anemias; etc.

i. THE NURSE IN RELATION TO TUBERCULOSIS

The cause of tuberculosis and its control. Personal protection. The factor of heredity, age, family history, contagion.

The several expressions of the disease: Tuberculosis of bones and joints Tubercurous lymph nodes. Tuberculous meningitis. Tuberculous peritonitis. Pulmonaly tuberculosis.

The hygiene of tuberculosis: in the hospital; in the hospital tent; in the sanatorium; in the home. The relations of climate.

k. THE CARE OF CONTAGIOUS DISEASES

The isolation ward; the isolation room; methods of isolation and quarantine.

The care of infected bedding and clothing; its disinfection.

The care of the infected skin; mouth; nose; throat.

Irrigation and vaporization; instruments of each.

The care of the infected excreta and stools.

The care of infected utensils and supplies.

The agency of insects and other vermin as carriers of contagion.

The nurse as a carrier of contagion. The self-protection of nurse.

The ultimate disinfection or fumigation of patient; nurse; clothing; bedding; utensils; furniture; room or ward.

The relations to general practice of contagious disease.

PRINCIPLES OF NURSING

a. GENERAL CARE OF PATIENTS

The patient; dressing and undressing; initial bath; disposition of patients' clothing; its renovation.

The toilet of hair; mouth; teeth; hands, etc.; bed sores, causes and treatment.

The patients' clothing; changes of personal linen.

The making of beds; treatment of mattrass; changing of bed-linen; rubber sheets.

Care of bed-utensils; their uses and character.

The collection, measurement and preservation of urine. Catherization.

The collection and preservation of fœces. The collection and preservation of sputum.

The care and uses of rubber bags, ice-caps, coils, syringes, catheters, etc.

b. BATHS AND BATHING

Forms of bath; their uses and effects; their standard temperatures.

Methods of bathing; preparation and care of patient in bathing.

Hot and cold packs. Alcohol bathing. Topical application to skin.

c. SPECIAL METHODS OF TREATMENT

Enemata; irrigating, evacuant, sedative, astringent, nutrient.

Douches; utensils and methods. Irrigations.

External applications; compresses; fomentations; stupes; poultices; plasters; blisters; cupping; Bier treatment.

Lavage; test meals; gavage; nasal feeding; methods of forced feeding.

Transfusion; hypodermoclysis; infusion; lumbar puncture.

Uses and administration of oxygen.

Thoracentesis; paracentesis; exploratory procedures.

The cautery; forms and uses.

d. MODES OF ADMINISTRATION OF MEDICINES

Times of administration; method; system.

Administration by mouth; by stomach tube; by rectum; by hypodermatic method.

Care of poisons. Control of medicinal agents in relation to habit.

BACTERIOLOGY

a. BACTERIAL AND PARASITIC DISEASES

Their causes and means of control; their relation to hospital life; to general nursing; their special nursing.

b THE RELATIONS OF BACTERIOLOGY TO SURGERY.

The micro-organisms of surgical significance. Asepsis and antisepsis.

SURGERY

a. THE PRINCIPLES OF STERILIZATION

Study of sterilizers; their forms and management; methods of use applied to specific results.

The sterilization of the person; surgical cleanliness. Care of hands; face; hair; mouth; nose.

The sterilization of clothing; surgical suits. Detail of care. Dressing rooms.

The sterilization of utensils; instruments; supplies.

Aseptic and antiseptic solutions; their preparation and control.

The preparation of sterile dressings.

b. SURGICAL SUPPLIES

Surgical dressings; moist and dry.

Bandages; their form; variety; uses; preparation.

External applications; dusting powders; solutions; unguents.

Splints; pads; gloves; syringes; etc.

The instrument room or cabinet.

c. BANDAGING

A course of demonstrations and practical exercises in the uses and methods of application of bandages of all forms.

d. SURGICAL EMERGENCIES

Wounds; their causes, results and care. Inflammation. Suppuration.

Hemorrhages; points of origin; character; continuance or recurrence; causes.

Principles of control; methods.

Burns, scalds, etc.; their nature; extent; methods of treatment.

Fractures, dislocations and sprains. Varieties and immediate treatment.

Shock, collapse, fainting; other causes of unconsciousness.

e. PRINCIPLES OF SURGICAL INFECTION

Septicemia. Pyemia. Erisypelas. Gangrene. Necrosis. Bedsores and their treatmeat.

f. ANESTHESIA AND ANESTHETICS

General anesthesia; its several degrees; duration and danger; its after treatment.

Nature of anesthtics. Varieties. Comparative values and dangers.

Local anesthesia. Agents and methods of production. Treatment.

GENERAL NURSING OF SURGICAL CASES

a. PRE-OPERATIVE-CARE

Feeding. Management of bowels and bladder. Special care for special cases. Medication and hypodermics. Preparation of patient; site of operation, etc.

b. OPERATIVE CARE

The operating room; the operating table; positions of patients on operating table for various operations; and precautions to be taken. Coverings of patient. Washing of patient; solutions used. Pulse, etc., during operation. The use of hypodermics; the oxygen apparatus; electrical apparatus, etc.

c. POST-OPERATIVE CARE

Shock; observation of pulse and temperature. Use of pneumonia jacket. Vomiting. Use of water. Secondary hemorrhages and signs of hemorrhage. Care of bladder and bowels.

Post-operative infections and evidences of infections. Dressings. Position of patient and bed. Feeding.

d. THE CARE OF SPECIAL SURGICAL CONDITIONS

Pain; its importance; significance; location. Evidence and significance of pus formation or accumulation. Tumors; benign and malignant. Appendicitis, Hernia. Hemorrhoids and rectal conditions.

e. STUDY OF DEFECTS AND DEFORMITIES

The mechanics of the normal body. The nursing of orthopedic cases.

OBSTETRICS

a. THE PHYSIOLOGY OF PREGNANCY; the care of the pregnant mother.

b. THE ACCIDENTS OF PREGNANCY; their nursing. Evidences of extra-uterine pregnancy.

c. THE PHYSIOLOGY OF PARTURITION. Study of minor aids to labor.

d. THE NURSING OF LABOR. The obstetrical outfit. The sterilization of materials and dressings. Obstetrical suits.

The preparation of the confinement room. The preparation of accessories; of obstetrical instruments; of bed and bed-clothing; of the patient.

The arrangement of the patient in the several positions for examination and delivery; for forceps delivery; for placental extraction.

The care of the placenta. The care of patient immediately following labor. The abdominal binder.

The care of the obstetrical convalescent. The conditions of the lochia. The uses of the vaginal douche. The employment of enemata. Catheterization after delivery. The care of breasts; cleanliness, support, massage, milk extraction.

Complications following labor. Post-partum hemorrhage; its management. Constipation and its relief. Puerperal fever; its causes and treatment. Puerperal convulsions; causes and control. Puerperal insanity; history, predisposition, care.

GYNECOLOGY

Gynecological terms and definitions; conditions of the pelvis which bear upon the nursing of pelvic diseases.

The preparation of gynecological patients for examination; for operation.

The general care of gynecological cases. Special modes of treatment at the hands of the nurse.

NERVOUS AND MENTAL DISEASES

a. Insanity; its common forms and usual symptoms. Principles of nursing insane patients.

b. Epilepsy; Its manifestations; immediate and general care.

c. Neurasthenia; Hysteria; their recognition and distinctive features. Methods of Nursing. Principles and practice of rest cure. General Management of nervous cases.

DISEASES OF THE EYE, EAR, NOSE AND THROAT

Lectures, illustrated by stereopticon, upon the anatomy and physiology of these organs. The general and local care of diseases, including instruction in applications to the eye, douches and other remedies to the ear, nose and throat. The recognition and care of foreign bodies in eye, ear, nose and throat. Instruction in the use of artificial and ordinary leech. The prevention and treatment of ophthalmia neonatorum. Preparation for operations and care after operation, etc.

PHYSIOLOGIC CHEMISTRY

a Water: Its uses in the human body; quantity and character of supply; its food relations; the water-diet; substitutes for water.

b. Milk: The composition of the human milk; the colostral milk. Comparison with bovine milk. Analysis.

c. The Urine: Its normal composition. Analysis. Quantity, physical conditions, collection.

PRACTICAL DIETETICS

a. The Dietary of Diseases. Conditions of digestion and metabolism in disease. Influences of age and sex. Relation of food supply to functional inactivity Relation to tissue loss. Relation to elimination.

b. Dietaries of Special forms of Disease. Diet in continued fevers; in gastro-intestinal disorders; in respiratory disorders; Diet in disorders of nutrition; in renal disorders; in cardiac disorders; in diabetes.

c. Dietaries of Convalescence. Milk diets. Light diets. General diets.

d. The Care of Food-Stuffs. Their protection from dust, flies and vermin. Their temperature conditions. Storage of foods. Treatment of frozen foods.

ETHICS AND PRINCIPLES OF NURSING

a. The duties of the superintendent of nurses.
b. The duties of the hospital economist and dietician.
c. The duties of the head nurse; the day nurse; the night nurse.
d. The duties of pupil nurses.
e. The duties of the orderly.
f The duties of the ward maid.
g. Hours of service; rest hours; exercise; order of employment.
h. Departments of management; store-room; linen-room; laundry; halls and corridors; general kitchen; ward kitchens.
i. Nurses' Home.

HOUSEHOLD ECONOMICS

a. Sanitary Details of Construction

Walls: Relative value of structural materials; sanitary values of wall coverings and surfaces.

Floors: Relative merits of structural materials; sanitary values of different floor-coverings.

Windows: Position and area. Window shades and draperies.

Plumbing: Sanitary structural features; recognition of defects; care of plumbing fixtures.

Ventilation: Sanitary requirements; causes of contamination; relation to temperature or heating; means of inlet, filtration, distribution and outlet.

Heating: Sources of heat; methods of supply; direct and indirect radiation; degree of heating and room temperatures.

b. THE ROOMS OF THE DWELLING

The Living Rooms: Size, ventilation; lighting; color; furnishings; utensils.

The Dining Rooms: Size, ventilation; lighting; color; furnishings, utensils.

The Bed-rooms: Size, air-capacity, ventilation, lighting, sun exposure; floors and floor coverings; care of rooms. Sleeping-room furnishings; single beds; care and renovation; beds and bed coverings; mattrasses; care and treatment.

Clothes' Closets and Presses: Size, situation; ventilation; airing and drying of clothing; protection from insects; protection from and removal of dust. Mending of clothing.

Linen Store-room: Arrangement and care. Kind and quantities of supplies. Removal and renovation. Sorting and mending.

Laundry: Size, situation, working capacity, ventilation. Laundry apparatus; its sanitary care. Laundry utensils and materials. Drying and ironing rooms.

Pantry: China and food closets. Size, lighting, ventilation. Equipment. Care of contents. Protection from vermin.

Dietary Store-room: Relation to bacterial contamination and conveyance. Influences of heat and cold. Protection from dust.

Refrgerators: Form, size, structural material, ventilation. Food-capacity; ice capacity; care of ice. Cleanliness of ice, ice water and food compartments. Arrangement of food. Refrigerator food containors. Influence of food materials upon each other.

House cleaning; daily and peridical practice. Domestic and scientific methods. Cleaning devices. Sanitary details.

Household refuse: waste disposal; incineration. Refuse containers, collection and removal. Treatment of receptacles.

H

THE COLLEGE OF DENTISTRY

The College of Dentistry

FACULTY

Cyrus Northrop, LL.D., President

Alfred Owre, D.M.D., M.D., C.M., Dean, Professor of Operatic Dentistry and Dental Metallurgy

Richard O. Beard, M.D., Professor of Physiology

Thomas G. Lee, B.S., M.D., Professor of Histology and Embryology

George B. Frankforter, M.A., Ph.D., Professor of Chemistry

Frank F. Wesbrook, M.A., M.D., Professor of Pathology and Bacteriology

Thomas B. Hartzell, M.D., D.M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery

Oscar A. Weiss, D.M.D., Professor of Prosthetic Dentistry and Orthodontia

Charles A. Erdmann, M.D., Professor of Anatomy

F. W. Springer, E.E., Professor of Electrical Engineering

James M. Walls, D.M.D., Professor of Clinical Operative Dentistry

Forest H. Orton, D.D.S., Professor of Crown and Bridge-Work

Ira Harris Derby, B.S., Assistant Professor of Chemistry

R. H. Mullin, B.A., M.B., Assistant Professor of Pathology and Bacteriology

Winfield S. Nickerson, Sc.D., M.D., Assistant Professor of Histology and Embryology

F. H. Scott, Ph.D., M.B., Assistant Professor of Physiology

M. R. Wilcox, M.D., Assistant Professor of Physiology

H. A. Britzius, M.A., M.S., Instructor in Technic

Norman J. Cox, B.S., D.M.D., Instructor in Operative Dentistry

G. M. Damon, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy

C. F. Disen, M.D., Demonstrator of Anatomy

E. Fidlar, M.B., Junior Demonstrator of Pathology and Bacteriology

H. S. Godfrey, D.M.D., Instructor in Operative Dentistry

R. O. Green, D.D.S., Instructor in Operative Dentistry

Charles A. Griffith, D.D.S., Instructor in Operative Dentistry

J. A. Handy, Ph.C., Instructor in Chemistry

Earle R. Hare, B.S., M.D., Instructor in Anatomy

Mary V. Hartzell, D.M.D., Instructor in Comparative Dental Anatomy

U. E. Heddy, D.D.S., Instructor in Crown and Bridge-Work

R. R. Jones, D.D.S., Instructor in Operative Dentistry

W. F. Lasby, B.S., D.D.S., Instructor in Prosthetic Dentistry

H. C. LAWTON, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy
J. F. LEMSTROM, M.D., Instructor in Histology and Embryology
HERMAN A. MAVES, D.D.S., Instructor in Operative Dentistry
OSCAR OWRE, M.D., Instructor in Oral Surgery
JAY N. PIKE, D.D.S., Instructor in Orthodontia
H. M. REID, D.D.S., Instructor in Prosthetic Dentistry
H. E. ROBERTSON, A.B., M.D., Demonstrator in Pathology
J. F. SCHEPCIK, B.S., Ph.G., M.D., C.M., Instructor in Materia Medica
J. P. SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry
C. C. TYRELL, B.A., M.D., Prosector of Anatomy
ANDREW J. WEISS, Instructor in Technics
AMOS S. WELLS, B.A., D.D.S., Instructor in Crown and Bridge-Work
F. N. WILSON, Assistant in Anatomy
FRANK R. WRIGHT, D.D.S., M.D., Instructor in Anaesthesia and Oral Surgery

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MRS. M. C. CLYDE, Professional Nurse
MISS H. E. COOKE, Professional Nurse
A. L. MOORE, Infirmary Clerk

General Information, Rules and Regulations

The regular course covers a period of three years of collegiate study, each year representing nine months in actual attendance.

The University now offers an optional six year course of study. The first three years of the course are given in the College of Science, Literature and the Arts. The last three years are given in the College of Dentistry. It leads to the bachelor's degree at end of the first four years and to the degree of doctor of dental surgery at the end of the six year course.

For schedule of lectures, announcements, changes in college rules, etc., see bulletin board.

Rules and regulations of the infirmary and labratories are posted in their respective places.

REQUIREMENTS FOR ADMISSION

For list and descriptiion of subjects accepted for admission see pages 68, 69 and 72.

ADVANCED STANDING

Applicants for advanced standing must present satisfactory evidence of possessing the preliminary educational qualifications required of the class they desire to enter.

They must also satisfy the professors of the branches from which they wish to be exempt, that the work pursued by them in other institutions was equal in scope and amount to that yassed by the class they propose to enter.

No credits are accepted unconditionally, the faculty reserving the privilege of examining any applicant when deemed necessary.

All certificates pertaining to advanced standing must be presented to the dean who will send them to the respective professors for acceptance or report of further requirements for acceptance.

Students coming from other schools must make up their technic conditions under supervision of the instructors of this school, at the convenience of the instructor.

One-year credit will be allowed graduates in medicine, but the dental technic branches of the first year must be taken and completed before advanced work in these branches can be entered upon.

EXAMINATIONS, STANDINGS AND CONDITIONS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject.

No student will be allowed to omit any freshman work in order to make up entrance conditions, except by special permission of the department affected.

Students will not be permitted to substitute private work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered to remove conditions at the opening of the school year in September. The examinations at the end of semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by a conference of the heads of the departments in which the work is pursued during that year.

All standings shall be reported officially to and from the registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove a condition until he presents a receipt from the cashier for the fee of said examination.

Conditions must be removed at the begining of the school year in September. No student who has any conditions unremoved at the close of this examination is allowed to continue with his class without the express permission of the dean upon the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work (by reason of having "failed") must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given in any year will become a "failed" student and must repeat the entire work of that year.

Students who carry "failures" into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

Practical work in the infirmary is not allowed to students having conditions, or incompleteness in any technic work.

ATTENDANCE AND DISCIPLINE

Attendance upon all lectures, and infirmary and labratory hours, as scheduled, is obligatory. A complete record of each student's attendance is kept, and all absences and tardinesses are noted.

Students to be eligible for final examinations, must have a record of not less than eighty per cent in attendance.

Habitual absence, continued indifference to study, or persistently poor scholarship, may subject the student to temporary or permanent suspension.

All laboratory courses must be taken in full and must invariably be entered upon during the first week in which they begin.

The connection of any student with this college may be terminated at any time, without a return of fees, whenever such action may be advisable on the ground of immorality or disorderly conduct, or a failure to conform to any of the established rules.

Students detected in the use of oustide help, as notes, etc., in quizzes or examinations, or of rendering assistance to other students during examinations, will be suspended or expelled. The possession of any secret aids while under examination, will be deemed presumptive evidence of guilt, and will subject the student to the same penalty as if detected in using them.

Any student detected in stealing will be permanently expelled from the college.

The practice of dentistry by students, except under the direct supervision of a preceptor, is prohibited by law in the state of Minnesota. Any student detected in violating this law will be suspended or expelled.

DEGREES

The degree of doctor of dental surgery is conferred by the Board of Regents upon the students who are recommended, by vote of the faculty, for graduation. Candidates for the degree must possess the following essential qualifications:

(1) Twenty-one years of age.

(2) Good moral character.

(3) Three full college years spent in the study of dentistry; the third year, at least, in this University, and the remainder in this or other recognized schools of dentistry.

(4) Satisfactory examinations passed in all branches of the curriculum.

FEES

The annual fee is one hundred and fifty dollars ($150.00). It includes all charges for matriculation, lectures, laboratory courses, dissections, technic materials, microscopes and graduation.

One-half of this fee will be payable when the student matriculates. The accountant's receipts for the portion will entitle the holder to take entrance examinations and to classify. The second half will be payable at the opening of the second semester. These receipts must be presented to and countersigned by the dean before entering upon the work of each semester.

A deposit of five dollars ($5.00) will be required in addition to the first semester fee, to cover loss of and breakage or damage to college property. This will be returned at the end of the year, providing there is no charge against the student. This fee is to be deposited with the University accountant each year when the student matriculates.

If the applicant fails to pass the entrance examinations, his fee will be returned by the accountant.

After having entered upon the course of study, fees are not returnable, and no rebate will be recommended should a student discontinue work, but the faculty may recommend the application of a part to the succeeding year.

The fee for condition examinations is one dollar ($1.00)

The fee for advanced standing examinations is one dollar ($1.00)

The fee for special examinations is five dollars ($5.00)

Special and graduate students will pay to the accountant a fee of thirty dollars per year for each study they pursue, and additional fees, varying from ten to thirty dollars, for each laboratory course they may select.

INSTRUMENTS, BOOKS, TOOLS AND MATERIALS

All students are required to provide themselvse with instruments, books, tools and materials as prescribed by the college.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

SUMMARY EXPENSES

	1st yr.	2d yr.	3d yr.
Tuition, Instruments, Tools and Books. . .	**$200 00**	**$350 00**	**$175 00**

SPECIAL LECTURES

Occasional lectures are given during the senior year on subjects having a general bearing upon the practice of dentistry, such as: Ethics Jurisprudence, Public educational measures, etc.

ALUMNI ASSOCIATION

An association of the graduates of the college has its annual meeting during commencement week.

President, E. F. Wanous, Syndicate Block, Minneapolis.

Secretary, B. A. Sandy, Andrus Building, Minneapolis.

Course in Dentistry

FRESHMAN YEAR

FIRST SEMESTER

ANATOMY 1, 2, 3 and 4, twelve hours, Professor Erdmann and Assistants
CHEMISTRY 1 and 3, sixteen hours, Professor Frankforter and Assistants
COMPARATIVE DENTAL ANATOMY 1, two hours, Dr. Hartzell
DENTAL ANATOMY 1, three hours, Drs. Damon and Lawton
PROSTHETIC DENTISTRY 1, fourteen hours, Drs. Damon and Lawton

SECOND SEMESTER

ANATOMY 5, twelve hours, Professor Erdmann and Assistants
DENTAL ANATOMY 2, three hours, Drs. Damon and Lawton
HISTOLOGY AND EMBRYOLOGY 5, eight hours, Professor Lee and Assistants
PHYSIOLOGY 1, six hours, Professor Beard and Assistants
PROSTHETIC DENTISTRY 2, eight hours, Drs. Damon and Lawton

JUNIOR YEAR

FIRST SEMESTER

CROWN AND BRIDGE-WORK 1, eight hours, Professor Orton and Assistants
MATERIA MEDICA 1, two hours, Dr. Schefcik
OPERATIVE DENTISTRY 1, fifteen hours, Professors Owre, Walls and Assistants
ORTHODONTIA 1, six hours, Professor Weiss and Assistants
PATHOLOGY AND THERAPEUTICS 1, two hours, Professor Hartzell and Assistants
PROSTHETIC DENTISTRY 3, eleven hours, Professor Weiss and Assistants

SECOND SEMESTER

CROWN AND BRIDGE-WORK 2, eight hours, Professor Orton and Assistants
DENTAL METALLURGY 1, two hours, Professor Owre
MATERIA MEDICA 2, two hours, Dr. Schefcik
OPERATIVE DENTISTRY 2, fifteen hours, Professors Owre, Walls and Assistants
ORTHODONTIA 2, four hours, Professor Weiss and Assistants
PATHOLOGY AND BACTERIOLOGY 1, two hours, Professor Wesbrook and Assistants
PATHOLOGY AND THERAPEUTICS 2, two hours, Professor Hartzell and Assistants
PROSTHETIC DENTISTRY 4, eleven hours, Professor Weiss and Assistants

SENIOR YEAR

FIRST SEMESTER

CROWN AND BRIDGE-WORK 3, six hours, Professor Orton and Assistants
DENTAL ELECTRICITY 3, one hour, Professor Springer
OPERATIVE DENTISTRY 3, twenty hours, Professors Owre, Walls and Assistants
ORAL SURGERY 1, three hours, Professor Hartzell and Assistants
ORTHODONTIA 3, five hours, Professor Weiss and Assistants
PHYSICAL DIAGNOSIS AND ANOETHESIA 1, one hour, Drs. Wright and Owre
PROSTHETIC DENTISTRY 5, eight hours, Professor Weiss and Assistants

SECOND SEMESTER

CROWN AND BRIDGE-WORK 4, six hours, Professor Orton and Assistants
DENTAL METALLURGY 1, two hours, Professor Owre
OPERATIVE DENTISTRY 4, twenty hours, Professors Owre, Walls and Assistants
ORAL SURGERY 2, three hours, Professor Hartzell and Assistants
ORTHODONTIA 4, five hours, Professor Weiss and Assistants
PHYSICAL DIAGNOSIS AND ANOESTHESIA 2, one hour, Drs. Wright and Owre
PROSTHETIC DENTISTRY 4, eight hours, Professor Weiss and Assistants

Courses of Instruction

ANATOMY

Charles A. Erdmann, M.D., Professor of Anatomy
Earle R. Harb, B.S., M.D., Instructor in Anatomy
C. F. Disen, M.D., Demonstrator of Anatomy
C. C. Tyrrell, Ph.B., M.D., Prosecutor in Anatomy
F. N. Wilson, Assistant in Anatomy

1. **Osteology** — Professors Erdmann, Drs. Harb and Tyrrell
   Four credits (twelve hours of each week, for six weeks) — First quarter
   Required of freshmen.
   Lectures and recitations upon the human skeleton and supplementary work on the osteology of domestic mammals. Practical study of the bones of the human body, and recitations from the specimen.

2. **Syndesmology** — Professor Erdmann, Drs. Harb and Tyrrell
   Two credits (twelve hours of each week, for three weeks) — First quarter
   Open to students having completed course 1. Required of freshmen.
   Lectures and recitations covering the articulations, including the structure and movements of joints. Demonstrations from the specimen and preparation.

3. **Splanchnology** — Professors Erdmann, Drs. Harb and Tyrrell
   Three credits (twelve hours of each week, for four and one-half weeks) — Second quarter
   Open to students having completed course 2
   Lectures and recitations on the thoracic and abdominal vicera, supplemented by the study of dissected specimens and models.

4. **Neurology** — Professor Erdmann, Drs. Harb and Tyrrell
   Three credits (twelve hours of each week for four and one-half weeks) — Second quarter
   Open to students having completed course 3
   Lectures and recitations on the cerebro-special and sympathetic nervous system.

5. **Dissection** — Drs. Disen, Harb and Tyrrell
   Six credits (twenty-four laboratory hours each week, for nine weeks) — Fourth quarter
   Open to students having completed course 4. Required of freshmen.
   Dissection of a complete lateral half of the human body, with special reference to the head and neck. Dissection of the human and comparative brain.

CHEMISTRY

G. B. Frankforter, M.A., Ph.D., Professor of Chemistry
I. H. Derby, B.S., Assistant Professor of Chemistry
J. A. Handy, Ph.C., Instructor in Chemistry

1. **General Chemistry** — Assistant Professor Derby and Mr. Handy
   Five credits (four recitation hours and twelve laboratory hours for nine weeks) — First quarter
   Required of freshmen.

3. **CROWN AND BRIDGE-WORK** PROFESSOR ORTON AND ASSISTANTS
Three credits (six laboratory hours per week) First semester
Open to students completing 1 and 2. Required of seniors.
Clinical lectures dealing with questions arising in the infirmary and clinical practice covering the entire field of crown and bridge-work.

4. **CROWN AND BRIDGE-WORK**
Continuation of 3 as outlined

DENTAL ANATOMY

G. M. DAMON, D.D.S., Instructor in Prosehetic Dentistry and Dental Anatomy

H. C. Lawton, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy

1. **DENTAL ANATOMY** DR. DAMON, DR. LAWTON
Two credits (one recitation and two laboratory hours per week) First semester
Required of Freshmen.
This course will consist of lectures, recitations and such laboratory work as drawing dissection, modeling and carving of teeth.

2. **DENTAL ANATOMY** DR. DAMON, DR. LAWTON
Two credits (one recitation hour and two laboratory hours per week) Second semester
Open to students completing course 1. Required of freshmen.
Continuation of course 1 as outlined above.

DENTAL ELECTRICITY

F. W. SPRINGER, E.E., Professor of Electrical Engineering

3. **DENTAL ELECTRICITY** PROFESSOR SPRINGER
One credit (two recitation hours per week for nine weeks) First quarter
Required of seniors.
A course of instruction will be given upon the different forms of batteries, dynamos and motors in use in dental practice. Their construction, use, care and operation. Electricity as used in surgery and for therapeutic purposes, including application of x-rays, will be made clear bv laboratory demonstrations and practical application.

DENTAL METALLURGY

A. OWRE, D.M.D., M.D., C.M., Professor of Operative Dentistry and Dental Metallurgy

DENTAL METALLURGY PROFESSOR OWRE
Two credits (two recitation hours per week) Second semester
Required of juniors.
Lectures, recitations and demonstrations, taking up the most important metals with special reference to those used in dentistry.

Lectures and laboratory work. The course includes a detailed study of chemical and physical properties of the non-metals and their more important compounds.

3. QUALITATIVE CHEMISTRY — ASSISTANT PROFESSOR DERBY AND MR. HANDY

Five credits (four recitation hours and twelve laboratory hours for nine weeks) — Second quarter

Open to students completing course 1. Required of freshmen.

Lectures, recitations and laboratory work. The course includes the general functions of the metals and acids with their qualitative separation and indentification.

For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry in the department of physiology, in the pathology of the large number of lines.

The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology and in the clinical laboratories in connection with the microscopy of the urine.

COMPARATIVE DENTAL ANATOMY

M. V. HARTZELL, D.M.D., Instructor in Comparative Dental Anatomy.

1. COMPARATIVE DENTAL ANATOMY — DR. HARTZELL

Two credits (four recitation hours per week for nine weeks) — Second quarter

Open to students completing anatomy 1 and 2. Required of freshmen.

The instruction in this subject embraces a comparative study of animal life, giving special attention to number, form and arrangement of teeth, and their adaption to food habits, ranging from the horny teeth of the invertebrates, to the complex tooth-forms of the most highly specialized animals of the present time. The lectures will be illustrated with the stereopticon, casts, models and skulls.

CROWN AND BRIDGE-WORK

F. H. ORTON, D.D.S., Professor of Crown and Bridge-Work

A. S. WELLS, B.A., D.D.S., Instructor in Crown and Bridge-Work

U. E. HEDDY, D.D.S., Instructor in Crown and Bridge-Work

H. A. BRITZIUS, M.A., M.S., Instructor in Crown and Bridge Technic

1. CROWN AND BRIDGE-WORK — PROFESSOR ORTON AND ASSISTANTS

Five credits (two recitation and six laboratory hours per week) — First semester

Required of juniors.

Lectures, recitations, demonstrations and laboratory work. The latter includes all the more important forms of crowns and bridges.

2. CROWN AND BRIDGE-WORK — PROFESSOR ORTON AND ASSISTANTS

Five credits (two recitation and six laboratory hours per week) — Second semester

Open to students completing 1. Required of juniors.

Continuation of course 1, as outlined above.

HISTOLOGY AND EMBRYOLOGY

T. G. **LEE**, B.S., M.D., Professor of Histology and Embryology

W. S. **NICKERSON**, Sc.D., M.D., Assistant Professor of Histology and Embryology

J. F. **LEMSTROM**, M.D., Instructor in Histology and Embryology

5. **HISTOLOGY AND EMBRYOLOGY** — PROFESSOR LEE AND ASSISTANTS
Six credits (eight recitation and eight laboratory hours per week)
Fourth quarter

Required of freshmen.

The course will consist of lectures, laboratory work and demonstrations. The instruction will include a general consideration of the structure and the properties of protoplasm, the cell,cell division, the formation of the germ layers and the differentiation of tissues and organs. Also a detailed study of the structure of the various tissues, epithelium, connective, bone, muscle, blood and lymph; the vascular and lymphatic system, the respiratory system, the excretory system and the nervous system. Special emphasis will be laid upon the full knowledge of the development and structure of the head, mouth, jaw, teeth and the other portions of the digestive system.

Each student will prepare a number of specimens illustrating the structure of the teeth and jaws. The work is based upon the study of human tissues supplemented by considerable amount of comparative work on other forms for the purpose of a better understanding of the structural conditions in man.

MATERIA MEDICA

J. F. **SCHEFCIK**, B.S., Ph.G., M.D., C.M., Instructor in Materia Medica

1. **MATERIA MEDICA** — DR. SCHEFICK
Two credits (two recitation hours per week) — First Semester
Required of juniors.

This subject is covered as thoroughly as its importance demands. The writing and correct composition of prescriptions is an important feature. Particular attention is devoted to all therapeutic measures pertaining to dentistry. Practical work consists of the study of crude drugs and preparations, with demonstrations of all the pharmaceutical processes of importance.

2. **MATERIA MEDICA** — DR. SCHEFICK
Two credits (two recitation hours per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1 as outlined above.

OPERATIVE DENTISTRY

A. **OWRE**, D.M.D., M.D., C.M., Professor of Operative Dentistry and Dental Metallurgy

J. M. **WALLS**, D.M.D., Professor of Clinical Operative Dentistry

H. S. **GODFREY**, D.M.D., Instructor in Operative Dentistry

N. J. **COX**, B.S., D.M.D., Instructor in Operative Dentistry

H. A. **MAVES**, D.D.S., Instructor in Operative Dentistry

R. L. **GREEN**, D.D.S., Instructor in Operative Dentistry

C. A. Griffith, D.D.S., Instructor in Operative Dentistry
R. R. Jones, D.D.S., Instructor in Operative Dentistry

1. **Operative Dentistry** — Professors Owre, Walls and Assistants
Eight credits (three recitation and ten laboratory hours per week)
First semester
Required of juniors.
Lectures, recitations, demonstrations and laboratory work. The object of the latter is to teach technical procedure as much as possible before clinical practice is begun.

2. **Operative Dentistry** — Professor Owre, Walls and Assistants
Eight credits (three recitation and ten laboratory hours per week)
Second semester
Open to students completing 1. Required of juniors.
Lectures, recitations and clinical practice.

3. **Operative Dentistry** — Professors Owre, Walls and Assistants
Eleven credits (two recitation and eighteen laboratory hours per week)
Required of seniors. First semester
Lectures, recitations, conference work, demonstrations and clinical practice covering the entire field of operative dentistry.

4. **Operative Dentistry** — Professors Owre, Walls and Assistants
Eleven credits (two recitation and eighteen laboratory hours per week)
Second semester
Open to students completing 3. Required of senors.
Continuation of course 3 as outlined above.

ORAL SURGERY

T. B. Hartzell, D.M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery
F. R. Wright, D.D.S., M.D., Instructor in Anæsthesia and Oral Surgery
O. Owre, M.D., Instructor in Oral Surgery

1. **Oral Surgery** — Professor Hartzell and Assistants
Two credits (one recitation and two laboratory hours per week)
First semester
Open to students completing courses 1 and 2, pathology and therapeutics.
Required of seniors.
The subject is taught by lectures, recitations and practical demonstrations upon the abundant clinical material available in the infirmary.

2. **Oral Surgery** — Professor Hartzell and Assistants
Two credits (one recitation and two laboratory hours per week)
Second semester
Open to students completing 1. Required of seniors.
Continuation of course 1 as outlined above.

ORTHODONTIA

O. A. Weiss, D.M.D., Professor of Prosthetic Dentistry and Orthodontia
J. N. Pike, D.D.S., Instructor in Orthodontia
W. F. Lasby, B.S., D.D.S., Instructor in Prosthetic Dentistry
A. J. Weiss, Instructor in Technics

1. **ORTHODONTIA** — PROFESSOR WEISS AND ASSISTANTS
   Three credits (six laboratory hours per week) — First semester
   Required of juniors.
   This course consists entirely of technic work in the laboratory, comprising a brief course in the technique of steel which is followed by a comprehensive course in making regulating appliances, and the preparation of materials for the same.
2. **ORTHODONTIA** — PROFESSOR WEISS AND ASSISTANTS
   Three credits (three laboratory hours per week) — Second semester
   Open to students completing 1. Required of juniors.
   Continuation of course 1 as outlined above.
3. **ORTHODONTIA** — PROFESSOR WEISS AND ASSISTANTS
   Three credits (one recitation and four laboratory hours per week)
   Required of seniors. — First semester
   This course consists of lectures and recitations in which the theory and practice of orthodontia is fully considered.
   An ample clinic is provided which affords a comprehensive training in the practice of orthodontia. Every student is required to treat at least one case of irregularity of the teeth but may treat two or three cases.
4. **ORTHODONTIA** — PROFESSOR WEISS AND ASSISTANTS
   Three credits (one recitation and four laboratory hours per week) — Second semester
   Open to students completing 3. Required of seniors.
   Continuation of course 3 as outlined above.

PATHOLOGY AND BACTERIOLOGY

F. F. WESBROOK, M.A., M.D., C.M., Professor of Pathology and Bacteriology

R. H. MULLIN, B.A., M.B., Assistant Professor of Pathology and Bacteriology

H. E. ROBERTSON, B.A., M.D., Demonstrator in Pathology

E. FIDLAR, M.B., Junior Demonstrator of Pathology and Bacteriology

1. **BACTERIOLOGY AND PATHOLOGY** — PROFESSOR WESTBROOK AND ASSISTANTS
   Two credits (four recitation hours per week for nine weeks) — Second semester
   Required of juniors.
   A course of lectures, recitations and demonstrations of the general principles underlying pathology and bacteriology.

PATHOLOGY AND THERAPEUTICS

T. B. HARTZELL, D.M.D., M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery

1. **PATHOLOGY AND THERAPEUTICS** — PROFESSOR HARTZELL
   One and one-half credits (one recitation and one laboratory hour per week) — First semester
   Required of juniors.
   These subjects are taught by lectures and recitations involving general pathology as a foundation for the special pathology of the oral cavity; paying particular attention to the therapeutic requirements of the lesions of the mouth and teeth.

The work in pathology is supplemented by laboratory work under the care of the chair of pathology, department of medicine.

2. PATHOLOGY AND THERAPEUTICS — PROFESSOR HARTZELL
One and one-half credits (one recitation and one laboratory hour per week) — Second semester
Open to students completing 1. Required of juniors.
Continuation of course 1 as outlined above.

PHYSICAL DIAGNOSIS AND ANÆSTHESIA

T. B. HARTZELL, D.M.D., M.D., Professor of Clinical Pathology, Therapeutics and Oral Surgery
F. R. WRIGHT, D.D.S., M.D., Instructor in Anæsthesia and Oral Surgery
O. OWRE, M.D., Instructor in Oral Surgery

1. PHYSICAL DIAGNOSIS AND ANÆSTHESIA — PROFESSOR HARTZEL, DR. WRIGHT AND DR. OWRE
One-half credit (one laboratory hour per week) — First semester
Required of seniors.
The subject of physical diagnosis will be taught didactically and practically, and will have direct bearing upon the subject of anæsthesia and will be as complete as its importance demands.
A course in urinalysis will be given in connection with this course.
The technics of anæsthetics, both general and local, receive full consideration. All anæsthetics are administered in the clinic, and full instruction concerning their use is given. The members of the senior class are required, under direction, to administer them and extract teeth under these agents.

2. PHYSICAL DIAGNOSIS AND ANÆSTHESIA — PROFESSOR HARTZELL, DR. WRIGHT AND DR. OWRE
One-half credit (one laboratory hour per week) — Second semester
Open to students completing 1. Required of seniors.
Continuation of course 1 as outlined above.

PHYSIOLOGY

RICHARD OLDING BEARD, M.D., Professor of Physiology
F. H. SCOTT, Ph.D., M.B., Assistant Professor of Physiology
M. R. WILCOX, M.D., Assistant Professor of Physiology
J. P. SEDGWICK, B.S., M.D., Instructor in Physiological Chemistry

1. PHYSIOLOGY — PROFESSOR BEARD AND ASSISTANTS
Six credits (twelve recitation hours per week for nine weeks) — Third quarter
Required of freshmen.
This subject is taught by recitations and lectures, illustrated by practical demonstrations. These embrace the discussion and, so far as possible, the observation of the physiological ingredients of the animal body; of the physiology of cell life or the fundamental properties of the cell; of the nutritive media, blood lymph and chyle; of the elementary functions of the nervous system; the muscular tissues; the vascular mechanism; the alimentary canal; the organs of secretion, excretion and respiration, and of the function of metabolism.

PROSTHETIC DENTISTRY

O. A. WEISS, D.M.D., Professor of Prosthetic Dentistry and Orthodontia

H. M. REID, D.D.S., Instructor in Prosthetic Dentistry

G. M. DAMON, D.D.S., Instructor in Prosthetic Dentistry and Dental Anatomy

W. F. LASBY, B.S., D.D.S., Instructor in Prosthetic Dentistry

A. J. WEISS, Instructor in Technics

1. **PROSTHETIC TECHNICS** DRS. DAMON AND LAWTON
   Seven credits (fourteen laboratory hours per week) First semester
   Required of freshmen.
   This course consists entirely of technic work in the laboratory, comprising impression materials and their uses and the simpler processes of plate-work.

2. **PROSTHETIC TECHNICS** DRS. DAMON AND LAWTON
   Four credits (eight laboratory hours per week) Second semester
   Open to students completing 1. Required of freshmen.
   Continuation of course 1 as outlined above.

3. **PROSTHETIC DENTISTRY** PROFESSOR WEISS AND ASSISTANTS
   Six credits (one recitation and ten laboratory hours per week) First semester
   Open to students completing 1 and 2. Required of juniors.
   This course consists of lectures and recitations in which the principles and practice of plate-work are fully considered.
   The technic work in this course is a continuation of that begun in the freshmen year and consists of the more difficult plate-work. This work is graded and consists only of practical processes; obsolete processes and unnecessary repetition are avoided.

4. **PROSTHETIC DENTISTRY** PROFESSOR WEISS AND ASSISTANTS
   Six credits (one recitation and ten laboratory hours per week) Second semester
   Open to students completing 3. Required of juniors.
   Continuation of course 3 as outlined above.

5. **PROSTHETIC DENTISTRY** PROFESSOR WEISS AND ASSISTANTS
   Four credits (eight laboratory hours per week) First semester
   Open to students completing 4. Required of seniors.
   Lectures and recitations cover the treatment of cleft palate cases and other special forms of prosthesis.
   An excellent clinic for general prosthetic dentistry affords ample opportunity for the student to treat a variety of cases bv various methods of practice.

6. **PROSTHETIC DENTISTRY** PROFESSOR WEISS AND ASSISTANTS
   Four credits (eight laboratory hours per week) Second semester
   Open to students completing 5. Required of seniors.
   Continuation of course 5 as outlined above.

I

THE COLLEGE OF PHARMACY

The College of Pharmacy

FACULTY

CYRUS NORTHROP, LLD., President.

FREDERICK J. WULLING, Phm.D., LL.M., etc., Dean Professor of Pharmacology, Pharmaceutical Chemistry and Jurisprudence.

RICHARD O. BEARD, M.D., Professor of Physiology.

CHAS. F. SIDENER, B. S., Professor of Quantitative Chemistry.

GEORGE B. FRANKFORTER, M.A., Ph.D., Professor of Chemistry.

FRANK F. WESBROOK, M.A., M.D., C.M., Professor of Bacteriology.

EVERHART P. HARDING, M. S., Ph. D., Assistant Professor of Chemistry.

M. R. WILCOX, M. D., Assistant Professor of Physiology.

HIBBARD W. HILL, Assistant Professor of Bacteriology.

IRA HARRIS DERBY, B. S., Assistant Professor of Chemistry.

FREDERIC E. CLEMENTS, Ph.D., Professor of Botany.

E. D. BROWN, Pharm. D., M. D., Acting Professor of Materia Medica and Therapeutics.

.... Professor of Pharmacognosy

INSTRUCTORS AND ASSISTANTS

GUSTAV BACHMAN, Ph.C., Ph.M., Instructor in Pharmacy.

OSCAR BLOSMO, Ph. C., Assistant in Pharmacy.

FREDERICK K. BUTTERS, M. S., Instructor in Pharmaceutical Botany and Microscopy and Pharmacognosy.

EDWARD FIDLAR, B. A., M. B., Junior Demonstrator in Bacteriology.

FRANK F. GROUT, B. S., Instructor in Mineralogy.

JOHN A. HANDY, Ph. C., Instructor in Chemistry.

GEORGE D. HEAD, B. S., M. D., Instructor in Clinical Microscopy.

JOHN ELDON HYNES, Ph.C., Assistant in Clinical Microscopy.

ELMER L. HOTVEDT, Ph.B., Pharmacy Laboratory Assistant.

C. N. MCCLOUD, Phm. D., M. D., Lecturer on First Aids to the Injured.

J. P. SEDGWICK, B. S., M. D., Instructor in Physiological Chemistry.

W. D. SHELDON, M.D., Instructor in Therapeutics.

.... Instructor in Pharmaceutical Latin.

.... Assistant in Materia Medica.

.... Assistant in Pharmacognosy.

SPECIAL LECTURERS

W. A. FROST
STEWART GAMBLE
J. W. HARRAH
CHARLES H. HUHN
J. N. KIRBY
A. J. KLINE
C. B. MCCALL
HENRY MCCOLL
A. D. THOMPSON
E. A. TUPPER
THOMAS VOEGELI

ADMISSION

A—TO THE TWO-YEAR COURSE

While nearly all students enrolled in this college are graduates of full four-year high school courses, such a training prior to entrance is not obligatory at the present time. The requirements, however, are being raised gradually in such a way that soon they shall be a full high school preparation or an equivalent.

Applicants may be admitted without examination if they bring certificates of graduation from, or standing in, institutions of the collegiate grade or present other credentials showing that they have successfully completed the branches of study embraced in a full four-year high school course, or an equivalent, provided that among the branches completed are:

English, two years, including the principles of composition and practice in written expression.

Algebra, one year, elementary, up to beginning of higher algebra.

Geometry, one year, elementary.

Physics, one year, elementary.

Latin, two years: grammar, one year; Caesar (four books), one year.

II. Other applicants must pass examinations in the branches above specified, i. e., in English, algebra, geometry, physics and Latin, or present satisfactory evidence of having completed these branches, for which substitutes cannot be accepted.

Students will be allowed to carry not more than two conditions which, however, must be removed before the final examinations in the first year subjects.

In certain cases credit is given for drug store experience.

B—TO THE THREE-YEAR COURSE

The minimum requirements for admission to the three-year course are the same as those for admission to the two-year course II., with the exception that students may carry as conditions not more than three of the entrance subjects among which English cannot be. Students must pursue the branches in which they are conditioned during their first year and pass examinations in them or present evidence of having satisfactorily completed the branches. The subjects are not taught at the college, but may be taken at the academy near by, or at the city high schools or with private tutors. The University Y. M. C. A. usually establishes courses for the benefit of students conditioned in entrance branches.

Applicants whose preparatory course of study has not conformed precisely to the requirements above enumerated will be allowed to offer, in lieu of a portion of these requirements, equivalent preparation in similar branches of study; and if they show, by examination, or by other evidence, that their preparation has been substantially equivalent, such branches will be accepted as substitutes for those omitted.

The examinations for entrance are conducted by the faculty of the College of Pharmacy, in the pharmacognosy rooms, beginning at 9:00 a.m., on Tuesday, September 14, 1909. Lecture work begins as soon as possible after the examinations, usually the following day.

Every applicant is required to furnish a certificate of good moral character.

Those who do not pass the entrance examinations, may enter and complete their course in three years, provided they pursue the subjects required for admission in addition to the professional work that may be assigned to them, and pass their entrance examinations before the end of the first year.

REGISTRATION

All applicants for admission to the regular courses must present to the Dean not later than September 14, their school or high school certificates, diplomas or such other credentials as they may wish to offer toward meeting in whole or in part the entrance requirements. If these are found satisfactory the applicant will register in the office of the University Registrar, who will issue a card to the University Accountant to whom the applicant will pay the tuition and breakage fees and microscope rental and receive receipts therefor. Registration is completed by depositing these receipts in the office of the Dean. The student is then classified.

ADVANCED STANDING

Applicants for advanced standing must pass the entrance examinations or present the usual equivalents. They must furnish satisfactory evidence of time spent and subjects covered in previous professional studies, and must pass the examinations of all departments in which they wish to be exempt, if such examinations are deemed necessary by the professors in charge. Students will not be permitted to substitute private work in any branch for the regular course work.

UNCLASSED STUDENTS

Unclassed or special students may enter at any time providing there is laboratory room for them. They will not be rated on their work nor examined unless they make special request therefor. Work completed will be credited should the student subsequently enter the regular course.

EXAMINATIONS AND STANDINGS

Examinations are held at the end of the regular school year and during the last week of the first semester, and are supplementary to the written tests and quizzes that are held at frequent intervals during the year, and with them form largely the basis of final determination of fitness for promotion or graduation. Students are rated throughout the year, and all who have a standing of ninety per cent, or more in certain of the branches, may not be required to take the final examination in those branches.

Students are not required to write graduating theses, but instead they keep complete records of all their laboratory work. The records are to be kept in substantially bound books, to be approved by the faculty. The respective professors call for the records for inspection and rating once a month or oftener. Duplicates of records are to be furnished the college by the students. The college provides the paper.

The standing of students is determined by the results of recitations, written examinations, laboratory work and attendance. It is indicated by the terms "excellent," "passed," "conditioned," "incomplete," or "failed." Conditions may be removed as indicated below. Incomplete work must be made up before the final examinations of the following year.

In order to become eligible for final examinations, students are required to attend at least four-fifths of the lectures in each course. This rule is not intended for the benefit of those who seek admission after the opening of the college year, but is designed to cover cases of sickness or unavoidable absence. It does not apply to laboratory courses which must be taken in full and must be entered during the first week in which they begin.

Students having conditions in more than two major or in more than three minor subjects of the first year, cannot enter upon the second year's work. All entrance conditions must be removed before the next spring examination. Candidates for graduation must have removed all conditions before entering upon the second semester of the graduating year.

Condition examinations are held during the first week of the course in September. The dates are usually posted in June. Conditioned students are required to inform themselves as to these dates as soon as they learn that they are conditioned, as no other notice is given.

All who carry a condition and fail to remove it within one year will be charged an extra examination fee.

Students who carry a condition into a succeeding year may find a conflict of lecture or laboratory hours. In such cases they are to give preference to the lower course.

Absence will not be excused, unless satisfactory reasons are given to the professor in charge. Habitual absence without a satisfactory excuse, continued indifference to study, or persistently poor scholarship may subject the student to temporary or permanent suspension. Students are earnestly requested to be present at the beginning of the school year, but those who cannot enter in the fall may enter at the beginning of the second semester taking any of the subjects beginning then. Any of the facilities for work in the University are open to the students of this college, subject to the approval of the Dean. Opportunity is afforded to do advanced work in all branches. Text-books may be obtained after coming to the University.

The work of the college, as outlined in the following pages, is conducted by means of lectures, recitations and laboratory exercises. Students find their time fully occupied. Those who feel unable to complete the work in two years may divide it in a manner to complete it in three years. Practising pharmacists who desire to take certain branches of study may avail themselves of any of the college facilities.

GRADUATION REQUIREMENTS

Regular attendance at lectures, recitations and laboratory exercises is required. Students will not be permitted to present themselves for final examination unless they have been in attendance upon at least seven-eighths of the required number of exercises.

Every person upon whom the degree is conferred must be of good moral character, and must be at least twenty-one years old; must have attended two full lecture and laboratory courses, the last at this college, and must have passed a successful examination in the subjects required for graduation.

Drug store experience is not a requirement for graduation.

Those who fail to appear for examination after having paid their diploma fee, or those who do not pass satisfactorily, will be permitted to present themselves at any subsequent examination upon payment of an additional fee of five dollars, and complying with all other requirements.

DEGREES

The college confers the degrees Bachelor of Pharmacy, Master of Pharmacy and Doctor of Pharmacy for the completion of respectively the regular and the two graduate courses.

FEES

TWO YEAR REGULAR COURSE

First year tuition	$75.00	
Second year tuition	90.00	
		$165.00

THREE YEAR REGULAR COURSE

First year tuition	$55.00	
Second year tuition	55.00	
Third year tuition	55.00	
		$165.00

FIRST GRADUATE COURSE

Tuition for the entire course	$75.00	
Final Examination fee	10.00	
		$85.00

There are no other tuition fees. Fees are payable at the time of registration. Those desiring to take special work will be required to pay an average of fifteen dollars a subject for the lecture courses and twenty-five dollars for the laboratory courses.

Students will be charged for laboratory material if used unreasonably. At the end of the laboratory courses students will be required to pay for breakage and damage to utensils in their care. If a student is careful this charge need not amount to more than two or three dollars. Students are to provide themselves with a designated set of metric weights, a set of apothecary's weights and steel spatulas. The expense of these is within three dollars. Students using platinum crucibles are charged for them. Upon the return of the crucible in the original condition the charge is cancelled; if the crucible is in any wise damaged the full value is collected from the student. A rental of two dollars per college year or fraction thereof is collected for use of a microscope. All money is payable to the University Accountant, who will give receipts which must be deposited in the Dean's office.

Fees will not be returned, except in case of discontinuance for sufficient reason before the student has been assigned to a place in the laboratory.

A deposit of ten dollars will be made with the Accountant each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage to or in the college buildings and of breakage and loss of laboratory apparatus and material. It will be returned to the student at the close of each year, minus the cost of articles assigned to him that he fails to return in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give receipt. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him. All apparatus lost or damaged will be charged to him, and must be paid for before he can receive credits for his course, or take his annual examinations.

COLLEGE TRAINING FOR PHARMACISTS

The recognition of the need of substantial college training for pharmacists finds expression in many ways. In New York, Pennsylvania, Hawaii, Wisconsin, Ohio and Louisiana, such training is obligatory either by law or by rule of the boards of pharmacy. In a number of other states credit is given for college work. In Minnesota graduates from recognized colleges need to have only two years of practical experience, while all others must have had four years of drug store experience before they become eligible for examination by the State Board of Pharmacy for full license to practice in Minnesota. Graduates of the three-year course who have gained practical experience concurrently with their college work need only one additional year of drug store experience before they become eligible for examination for full registration.

At the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties, held at Indianapolis, Ind., in September, 1906, the following resolution was adopted:

"Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory. The rules of the boards of pharmacy are such as to promote and encourage it in all practicable ways. The special pharmaceutical education should include substantial laboratory courses." The training advocated by these two most representative bodies and by the American Pharmaceutical Association can be obtained only at colleges or schools of pharmacy of recognized standing. It is admitted that the State of Minnesota through its University College of Pharmacy is affording instruction of the most approved kind.

In the organization of this college the Board of Regents and the faculty have had the co-operation of the pharmacists of the state. The character of instruction is of high order and every effort is made to comply with the demands of the profession in the Northwest, or elsewhere, in the maintenance of a course of instruction of the highest grade.

POSITIONS FOR GRADUATES

The demand for graduates of this College has always been greater than the supply and is continually growing. The rule is that practically all of the senior class are engaged before graduation. This college is recognized in every state, including those in which standards of efficiency have been established, and its graduates are everywhere admitted to board examinations.

STATE BOARD OF PHARMACY

The State Board of Pharmacy meets at the College four times each year to examine candidates for registration. For information concerning the Board or State examinations address the Secretary of the Board, 502 Bank of Commerce Building, Minneapolis, Minn.

COLLEGE OF PHARMACY ALUMNI ASSOCIATION

The Alumni Association of the College of Pharmacy meets annually in the college building the day before commencement, at 3 p. m., Every member of the association is urgently requested to report change of address to the secretary.

THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

The College of Pharmacy of the University of Minnesota is one of the colleges constituting the membership of the American Conference of Pharmaceutical Faculties.

COMMUNICATIONS

Address communications to the Dean, Professor Frederick J. Wulling, University of Minnesota, Minneapolis, Minn.

PHI DELTA CHI

The Theta chapter of the Phi Delta Chi fraternity was organized at the College of Pharmacy in 1902. Students of the college of high scholarship and character are eligible to membership.

PRIZES

Nominations for membership in the American Pharmaceutical Association and the first year's dues are offered annually by Dean Wulling and Mr. Bachman to each of the two students earning respectively the highest total average of standings and the highest standing in pharmacy.

N. W. BR. A. PH. A.

The Northwestern Branch of the American Pharmaceutical Association, composed of the representative pharmacists of the Northwest, has its headquarters at the College of Pharmacy. About six meetings are held annually. Pharmacy students are eligible to membership in the Branch, but are privileged to attend the meetings without becoming members.

Courses of Instruction

Three courses are offered, the regular and two graduate courses.

The complete regular course extends over two years of nine full months each. Students may arrange their work so as to take the course in three years. It is quite possible that three years attendance will be required of students in this college in the near future. The sixteenth annual course begins on September 14, 1909, on which day all students in pharmacy should register. The office of the Registrar is open for the purpose of registration as early as September 10th, but students must first report at the Dean's office in the pharmacy building.

In addition to the regular course this college offers two graduate courses, the first continuing through one college year and leading to the degree "Master of Pharmacy," and the second continuing through an additional year or longer, and leading to the degree "Doctor of Pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. The curriculum includes higher pharmaceutical chemistry, pharmaceutical assaying, higher organic chemistry, proximate and ultimate analysis, chemistry of food, water analysis, toxicology, spectroscopic work, therapeutics, clinical microscopy and bacteriology, and a thesis of at least 3,000 words, embodying the results of original work, but this curriculum may be changed by the faculty if occasion or experience require.

The requirements for admission are a diploma from a Minnesota high school of the first grade, or an equivalent; a diploma from a college of pharmacy whose curriculum, extent and kind of work and length of undergraduate course are equal to those of the under-graduate work of this college; an acquaintance with either German or French sufficient to enable the student to read and understand the scientific literature of those languages. The fees for this course are seventy-five dollars, and an additional fee of ten dollars for final examinations. The rules relating to damage, waste and breakage in laboratories are the same as those applying to the undergraduate course.

The course leading to the doctor's degree will begin as soon as there are sufficient applicants.

PROPOSED NEW COURSES

Beginning as soon as the proposed enlarged quarters of the college permit, two additional courses will be instituted: the one a lower and shorter than the regular course to conform to the minimum requirements of the American Conference of Pharmaceutical Faculties; the other, a higher than the regular course to lead to the degree Bachelor of Science in Pharmacy, and to include four years of work. The details have not yet been worked out but it is probable that the former will include about two-thirds of the work of the regular course and will cover two years of at least six months each. Possibly opportunity will be offered to complete the work in twelve consecutive months but this is doubtful. The entrance requirements will include the first year in high school or equivalent training or whatever the entrance requirements of the Conference may be at the time.

The higher course will cover four years of nine months each and will include two years of academic and cultural work. The qualifications for entrance to this course will be the same as those required for entrance to the College of Science, Literature and the Arts. Those presenting evidence of having completed the first two years of a collegiate course may complete the course in two years, providing the collegiate work completed includes certain subjects in the sciences and mathematics. Full announcement regarding these courses will be made duly.

Courses of Instruction

COURSES OF INSTRUCTION COMPRISING THE REGULAR PHARMACY COURSE

The complete regular course extends over two years of nine full months each. Students may arrange their work so as to take the course in three years. It is quite possible that three years attendance will be required of students in this college in the near future. The sixteenth annual course begins on September 14, 1909, on which day all students in pharmacy should register. The office of the Registrar is open for the purpose of registration as early as September 10th, but students must first report at the Dean's office in the pharmacy building.

FIRST YEAR

FIRST QUARTER

Botany 1, eleven hours, Mr. Butters and Assistant
Pharmacy 9, five hours, Professor Wulling
Chemistry 1, fifteen hours, Professor Derby and Mr. Handy

SECOND QUARTER

Botany 1, six hours, Mr. Butters and Assistant
Pharmacy 10, three hours, Professor Wulling
Pharmacy 1, 2 and 3, twelve hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Chemistry 2, fifteen hours, Professor Derby and Mr. Handy

THIRD QUARTER

Pharmacy 11, two hours, Professor Wulling
Pharmacy 4, nine hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Pharmacy 7, one hour, Mr. Bachman
Materia Medica 1, three hours, Professor Brown and Assistant
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby and Mr. Handy

FOURTH QUARTER

Pharmacy 11, two hours, Professor Wulling
Materia Medica 2, three hours, Professor Brown and Assistant
Pharmacy 5 and 6, six hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

Pharmacy 7, two hours, Mr. Bachman
Pharmacy 8, one hour, Mr. Bachman
Botany 2 and 3, nine hours, Mr. Butters and Assistant
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby and Mr. Handy

SECOND YEAR

FIRST QUARTER

Pharmacy 12, one hour, Professor Wulling
Pharmacy 13, two hours, Professor Wulling
Pharmacy 14, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Mineralogy and Crystallography 1, one hour, Mr. Grout
Pharmacognosy 1, five hours, Mr. Butters and Assistant
Pharmacy 16 and 17, sixteen hours, Professor Wulling, Mr. Bachman and Assistants
Pharmacy 23, one hour, Mr. Bachman
Physiology 1, two hours, Professor Beard and Wilcox.

SECOND QUARTER

Pharmacy 13, two hours, Professor Wulling
Mineralogy 2, one hour, Mr. Grout
Pharmacognosy 1, nine hours, Mr. Butters and Assistant
Pharmacy 18, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant
Chemistry 4, nine hours, Professor Frankforter, Assistant Professors Derby and Harding
Pharmacy 23, one hour, Mr. Bachman

THIRD QUARTER

Pharmacognosy 1, six hours, Mr. Butters and Assistant
Chemistry 3, sixteen hours, Professor Sidener and Assistant
Pharmacy 23, one hour, Mr. Bachman
Pharmacy 13, two hours, Professor Wulling
Pharmacy 19, fifteen hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

FOURTH QUARTER

Pharmacy 15, five hours, Professor Wulling and Mr. Bachman
Pharmacy 13, one hour, Professor Wulling
Pharmacy 23, two hours, Mr. Bachman
Pharmacognosy 2, six hours, Mr. Butters
Pharmacy 20, 21, 22, 24, twenty hours, Professor Wulling, Mr. Bachman, Mr. Blosmo and Assistant

Therapeutics 3, six hours, Professor Brown and Assistant
Pharmacy Law, one and one-half hours, Professor Wulling
First Aids, one and one-half hours, Dr. McCloud

THIRD YEAR

Students taking three years to do the work of the regular two-year course will divide the work in an equitable way subject to the approval of the Dean. Students are urged to devote three years to the completion of the course.

BACTERIOLOGY

1. GENERAL BACTERIOLOGY (POST GRADUATE) PROFESSOR WESBROOK
ASSISTANT PROFESSOR HILL, DR. MULLIN AND DR. FIDLAR

Nine credits (one hundred eight hours lecture and recitation, one hundred eight hours laboratory)

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of the bacteria will be dealt with. The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media will be studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken here.

Laboratory work involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, will be thoroughly carried out. Testing of various germicides—chemical and physical—and the use of bacteriological methods in the examination of drinking water will form an important part of the work. Eighteen hours per week during the last eight weeks of the second semester, second year.

PROFESSOR WESBROOK, DR. CHOWNING

BOTANY AND MICROSCOPY

FREDERIC E. CLEMENTS, Ph.D., Professor of Botany
FREDERIC K. BUTTERS, M. S., Instructor in Pharmaceutical Botany and Microscopy
.... Assistant

Eight credits (seventy-two hours lecture, one hundred forty-four hours laboratory) **First year**

1. COMPARATIVE MORPHOLOGY OF THE CRYPTOGAMS PROFESSOR CLEMENTS, MR. BUTTERS

The course embraces the comparative morphology of the cryptogams. Especial attention is paid to the green algae, the foundation of the vegetable kingdom. The other groups of algae and the fungi are briefly treated, particular stress being laid on their economic relations to other plants, to animals and to man. Examples of liverworts, mosses, ferns, and their allies are studied in the laboratory, and the line of development which leads from the algae through the archegoniate series to the seed plants is emphasized.

2. THE MORPHOLOGY, ANATOMY AND CLASSIFICATION OF THE HIGHER SEED PLANTS PROFESSOR CLEMENTS AND MR. BUTTERS

Thirty-six hours lecture, seventy-two hours laboratory

Prerequisite, botany 1

In this course especial attention is paid to vegetable histology. The characteristic plant tissues are examined, and their arrangement is noted in roots, stems, leaves, fruits and seeds. The formation and occurrence of carbo-hydrates, glucosides, alkaloids, organic acids, resins, gums, gum resins and oleo-resins are carefully studied. Considerable time is devoted to a study of the basis of classification of flowering plants and to the identification of plants in the field.

3. MICRO BOTANY MR. BUTTERS

Designed to furnish practical training in the use of the microscope, in the preparation of material for microscopic examination, including the use of micro-chemical reagents, and in the representation by drawings of all structures observed.

The work of this course is co-incident with that of 2 and 3

These courses occupy the equivalent of six hours a week throughout the junior year. They aim to give a comprehensive and scientific view of the vegetable kingdom, to lay a broad foundation for the study of pharmacognosy. Throughout the course attention is frequently directed in the lectures to the wider relations of plants to one another and to animals, and to the discussion of the plant as a living unit, thus bringing before the class the fundamental problems of plant physiology and ecology.

The successful completion of the course in botany is prerequisite to the study of pharmacognosy.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph. D., Dean of the School of Chemistry
Professor of Chemistry
CHAS. F. SIDENER, B.S., Professor of Quantitative Chemistry
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
IRA HARRIS DERBY, B.S., Assistant Professor of Chemistry
JOHN A. HANDY, Ph.C., Instructor in Chemistry

GENERAL CHEMISTRY PROFESSOR DERBY AND MR. HANDY

Five credits (forty-five hours lecture, ninety hours laboratory)
First quarter, first year

This course includes a study of the chemical properties of the metallic and non-metallic elements.

2. QUALITATIVE ANALYSIS ASSISTANT PROFESSOR DERBY AND MR. HANDY

Five credits (forty-five hours lecture, ninety hours laboratory)
Second quarter, first year

Prerequisites, chemistry 1

This course covers the common reactions of the metals and acids and their qualitative separation. The ionic theory and the law of mass action are discussed with especial reference to qualitative reactions.

3. QUANTITATIVE ANALYSIS PROFESSOR SIDENER AND ASSISTANT

Four and one-half credits (twenty-seven hours lecture, one hundred eight hours laboratory) Third quarter, second year

Prerequisites, chemistry 1 and 2

A study of the principles of quantitative estimation; gavimetric volumetric and gasometric.

4. **Toxicology, Water and Food Analysis (Post Graduate)** Professors Frankforter, Derby and Harding

Three and one-half credits (twenty-seven hours lecture, seventy-two hours laboratory) Second quarter, second year

The chemistry of the atmosphere, water, soil, etc.; the sanitary examination of air and water.

5. **Organic Chemistry** Professors Frankforter, Derby and Mr. Handy

Nine and one-half credits (seventy-two hours lecture, one hundred ninety-eight hours laboratory) Third and fourth quarters, first year

This course includes work in both the aliphatic and aromatic series and the preparation of the more important compounds.

CLINICAL MICROSCOPY

1. **Clinical Microscopy (Post Graduate)** Dr. Geo. D. Head and Dr. Hynes

Instruction includes (a) the macroscopical study of urine its colors, sediments, and finer chemical tests; (b) the microscopical study of urinary sediments, including blood, pus, epithelial cells, casts, etc.; (c) the macroscopical and microscopical study of sputum, including the study of sputa from cases of pneumonia, pulmonary tuberculosis, asthma, chronic bronchitis, etc.

Lectures and laboratory work. Eight hours weekly; last third, second semester, second year.

DISPENSARY PRESCRIPTION PRACTICE

The dispensing department of the University College of Medicine and Surgery Free Dispensary at 1810 Washington Avenue South has lately been placed in charge of the College of Pharmacy, Mr. G. Bachman having supervision. The senior students are sectioned into classes of three for the purpose of doing practical prescription work at the dispensary under the direction of Mr. Bachman or Mr. Blosmo. The dispensary practice continues throughout the college year.

FIRST AIDS TO THE INJURED

1. **Emergency Cases** Dr. McCloud

Two-thirds credit (twelve hours lecture) Third quarter, second year

A series of lectures designed to qualify the pharmacist to administer upon emergency cases before the arrival of the physician.

MATERIA MEDICA AND THERAPEUTICS

E. D. **Brown**, Pharm.D., M.D., Acting Professor of Materia Medica and Therapeutics

W. D. **Sheldon**, M.D., Instructor in Therapeutics

..........................Assistant in Materia Medica

1. **Inorganic Materia Medica** Professor Brown and Assistant

2. **Organic Materia Medica** Professor Brown and Assistant

Six credits (one hundred and eight hours lecture and recitation) Third and fourth quarters, first year

The work in inorganic and organic materia medica is based principally on the U. S. P., but unofficial and synthetic drugs are also studied. The course includes the study of the general characteristics of drugs and of physiological action. Pharmaco dynamics, including the study of the identity and quality of drugs, shares attention in the course of pharmacognosy.

3. **THERAPEUTICS** PROFESSOR BROWN AND DR. SHELDON

One credit (eighteen hours lecture and recitation)

Third quarter, second year

Prerequisites, materia medica 1 and 2

In this course drugs are studied in groups, as governed by their physiologic action, and the therapeutic features of such groups are described. Remedial measures other than those depending upon drugs, are fully considered.

PHARMACY

FREDERICK J. WULLING, Phm.D., LL.M., etc., Professor of Pharmacology
GUSTAV BACHMAN, Ph.C., Ph.M., Instructor in Pharmacy
OSCAR BLOSMO, Ph.C., Assistant in Pharmacy
F. A. STEINER, Laboratory Assistant

1. **HISTORY OF PHARMACY** PROFESSOR WULLING

One-third credit (six hours lecture) First quarter, first year

The history of the U. S. Pharmacopoeia through all its revisions.

Dispensatories, text-books, and works of reference.

2. **METROLOGY** PROFESSOR WULLING, MR. BACHMAN AND MR. BLOSMO

Two-thirds credit (twelve hours lecture) First quarter, first year

Weights and measures, including metric system; balances—construction, varieties, methods of weighing; specific gravity in detail; specific volume, alligation, etc.

3. **THE PHYSICS OF PHARMACY**

PROFESSOR WULLING, MR. BACHMAN AND MR. BLOSMO

Two and one-half credits (eighteen hours lecture, fifty-four hours laboratory) Second quarter, first year

Prerequisite, pharmacy 2.

Students are required to have had elementary physics before entering. This course covers a review and more extended elucidation of such divisions of physics as apply to pharmaceutical processes. Special attention is paid to heat. Specific heat; thermometers—the various scales, testing and comparing thermometers; combustion of solids, liquids and gases in various kinds of furnaces, stoves and burners; application of heat in drying ovens, steam, hot-air and water ovens; drying closets, desiccators, blow-pipes, crucibles; baths for controlling and equalizing heat; water-salt-oil-glycerine-paraffin-hot-air-baths; evaporation—spontaneous, rapid, slow, in vacuo; ebullition boiling points, fusion; sublimation, calcination, dehydration, torrefaction, roasting, reduction, oxidation; carbonization, deflagration, ignition, etc: solution—pharmaceutical simple, chemical, saturated; circulatory displacement; dialysis—construction of dialyser, osmosis, endosmosis, exosmosis; crystalloids and colloids, etc.

4. **PHARMACEUTICAL PROCESSES**

PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT

Three and one-half credits (twenty-four hours lecture, seventy-two hours laboratory) Second and third quarters, first year

Prerequisite, pharmacy 3.

The processes not taken up in 3, constitute the subjects of this course. In part they are: drug grinding and powdering; comminution; contusion; trituration; sifting; elutriation; levigation; lixiviation, filtration, filtering medii, filtration of solutions oils, syrups, rapid filtration; filtration in vacuo, hot filtration, colation; washing—displacement, continuous; decantation—the syphon and its uses; precipitation—methods, vessels, separating, drying, weighing; granulation—granular effervescent salts; desiccation; exsiccation; crystallization—water of crystallization, deliquescence, efflorescence; methods of obtaining crystals, collecting, draining, washing, drying crystals, fractional crystallization; distillation—stills, simple, fractional, destructive; extraction; maceration; expression percolation—history, theories, percolators, exhaustion, repercolation, continuous percolation, fractional percolation; clarification; decolorization.

5. PHARMACOPOEIAL PREPARATIONS
PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT
Five credits (thirty hours lecture, one hundred twenty hours laboratory) third and fourth quarters, first year.

This course includes the study and preparation of official bodies for which the U. S. P. gives formulae and processes, and includes water, solutions, syrups, mucilages, spirits, infusions, decoction, tinctures, fluid extracts, vinegars, wines, liniments, oleates, ointments, cerates, resins, oleo-resins, honeys; glycerites, mixtures, emulsions, elixirs, collodions, pills, capsules, powders, suppositories, bougies, plasters, papers, cachets, etc.,

6. MATHEMATICS OF PHARMACY PROFESSOR WULLING AND MR. BACHMAN
While students are required to have a preparation in arithmetic and algebra before entering, they receive frequent drills at stated hours and as occasion requires or suggests throughout the entire course. Students are required to take a final examination in the subject at the end of the first year, at which examination they must attain a rating of at least eighty per cent.

7. PHARMACY QUIZ MR. BACHMAN
Three credits (fifty-four hours) Second, third and fourth quarters, first year
Prerequisite, pharmacy 2, 3, 4, and 5.
A thorough review of the work covered in 2, 3, 4, and 5.

8. IDENTIFICATION OF INORGANIC OFFICIAL PREPARATIONS MR. BACHMAN
One credit (eighteen hours) Second and third quarters, first year
The study of the physical properties of official preparations.

9. CHEMICAL PHILOSOPHY PROFESSOR WULLING
One and one-half credits (twenty-seven hours lecture) First quarter, first year
Treats of the principles underlying chemistry, and endeavors to elucidate chemical facts and phenomena. The subject is divided into—chemical statics, embracing the study of the theories of atoms and molecules; atomic weights; atomic and molecular volume, quantivalence molecular structure, ions, electric qualities, etc., and—chemical dynamics, the study of reactions and their equations, thermics, chemical properties in general, etc.

1. THE PHARMACEUTICAL CHEMISTRY OF THE NON-METALS AND THEIR PREPARATIONS PROFESSOR WULLING
One and one-half credits (twenty-seven hours lecture)
Second quarter first year
Prerequisite, pharmacy 9.

11. PHARMACOPOEIAL INORGANIC SALTS AND THEIR OFFICIAL PREPARATIONS
PROFESSOR WULLING
Three credits (fifty-four hours lecture)
Third and fourth quarters, first year
Prerequisites, pharmacy 10.
Especial reference to description, properties and manufacture.

12. CLASSIFICATION OF PHARMACEUTICAL ORGANIC COMPOUNDS
PROFESSOR WULLING
One credit (eighteen hours lecture) Third quarter, first year.
A preparation for pharmacy 13.

13. Chemistry of the Pharmacopoeial Organic Compounds and Their Preparations Professor Wulling

Three credits (fifty-four hours lecture) First second and third quarters, second year.

Prerequisite, pharmacy 12.

This course includes the critical study of cellulin and its derivatives, destructive distillation products, starches, sugars, fermentation products, organic acids, fixed oils and fats, volatile oils, waxes, and animal fats, alkaloids, glucosides, animal drugs and products, etc.

14. Pharmacopoeial Testing Professor Wulling, Mr. Bachman and Assistant

Five credits (thirty-six hours lecture, one hundred eight hours laboratory) First quarter, second year

A critical study of the identity, purity, limit and percentage tests of the Pharmacopoeia and their application either wholly or in part to practically every official organic and inorganic salt and compound.

15. Quantitative Analysis of U. S. P. Salts and Preparations Professor Wulling and Mr. Bachman

Two credits (eighteen hours lecture, thirty-six hours laboratory) Fourth quarter, second year.

Prerequisites, chemistry 3 and pharmacy 14.

This course includes the gravimetric, volumetric and gasometric determinations of the U. S. Pharmacopoeia, but not pharmaceutical assay work (20).

16. Incompatibility Professor Wulling and Mr Bachman

One-half credit (nine hours lecture) Second and third quarter, second year

Therapeutic, pharmaceutical and chemical incompatibility is taken up in lecture and recitation work preliminary to 17.

17. Dispensing Professor Wulling and Mr. Bachman

Five and one-half credits (twenty-seven hours lecture, on hundred forty-four hours laboratory) Third and fourth quarter, second year

Prerequisite, pharmacy 16.

The study of the prescription and practical work in dispensing upwards of one hundred typical prescriptions.

18. Manufacture of Official Organic and Inorganic Salts and Preparations Professor Wulling, Mr. Bachman and Assistant

Four and one-third credits (twenty-four hours lecture, one hundred eight hours laboratory) Second quarter, second year

The preparation of about forty official salts included in the course.

19. National Formulary Professor Wulling and Mr Bachman

One credit (six hours lecture, twenty-four hours laboratory) Third quarter, second year

This course includes the study of the National Formulary and the making of one or more members of each class of preparations.

2. Pharmaceutical Assay Professor Wulling, Mr. Bachman and Assistant

One and one-third credits .(six hours lecture, thirty-six hours laboratory) Fourth quarter, second year

Prerequisites, pharmacy 14 and chemistry 3.

The quantitative determination of active constituents of a number of the potent organic drugs and preparations.

21. **SYNTHETIC REMEDIES** PROFESSOR WULLING
One-third credit (six hours lecture) Fourth quarter, second year.
Prerequisites, pharmacy 12 and 13 and chemistry 4.
A study of the chemistry of synthetic remedies in medical use.

22. **HOMEOPATHIC PHARMACY** PROFESSOR WULLING AND MR. BACHMAN
Fourth quarter, second year.

A brief exposition of the principles underlying homeopathic medication with some laboratory work.

23. **IDENTIFICATION OF SALTS** MR. BACHMAN
One and one-half credits (fifty four hours laboratory)
Second semester, first year and entire second year.

The study of the physical identity of the hour important official inorganic and organic salts.

24. **MICO-CHEMISTRY** PROFESSOR WULLING
Fourth quarter, second year. (Optional)
A brief course is provided for seniors if time permits.

PHARMACEUTICAL JURISPRUDENCE

1. **LAW FOR PHARMACISTS** PROFESSOR WULLIN
Two-thirds credit (twelve hours lecture) Fourth quarter, second year

The lectures introduce the subjects of contracts, agency, commercial paper, insurance, and discuss the liability of retail and manufacturing pharmacists, etc.

PHARMACEUTICAL MINERALOGY AND CRYSTALLOGRAPHY

1. **MINERALOGY** MR. GROUT
One credit (eighteen hours lecture) First quarter, second year.
Prerequisite.

A study of the occurrence and properties of minerals of pharmaceutical importance; ores of metals used in pharmacy; non-metallic minerals and mineral waters in their mineralogic and geologic relations.

2. **CRYSTALLOGRAPHY** MR. GROUT
One credit (eighteen hours lecture) Second quarter, second year.
Prerequisite, mineralogy 1.

A survey of form and more evident physical characters as a basis for practice in sight recognition of economic minerals and their distinction from common rocks.

PHARMACOGNOSY

....Professor of Pharmacognosy
FREDERIC K. BUTTERS, M. S., Instructor in Pharmacognosy
..................................Assistant

1. **CRUDE VEGETABLE DRUGS** MR. BUTTERS
Seven credits (fifty-four hours lecture, one hundred forty-four hours laboratory)
First, second and third quarters, second year.
Prerequisites, Botany 1, 2 and 3.

The vegetable drugs of the United States Pharmacopœia are taken up in the following order: Roots, rhizomes, tubers and bulbs, woods, barks, leaves, herbs, and flowers, fruits, seeds, plant exudations, resins, gum-resins waxes and starches. Each drug is carefully examined, both macroscopically and microscopically. Students are also provided with specimens for home study. The lectures give, in compact form, the history and important features of each drug, with consideration of its importance to the pharmacist. The quizzes include careful drill on the constituents, action and dose and official preparation of each drug considered. Identification receives careful attention and there are weekly tests of the student's ability. A short course is given in the microscopic examination of some of the more important alkaloids and glucosides, and of certain emulsions and inorganic salts, if time permits.

The drugs are considered in the following order:

Roots. Sarsaparilla (Mexican, Para and Honduras), senega, gentiana, taraxacum, pyrethrum, lappa, stillingia, sumbul, phytolacca, althæ, belladonna, calumba, glycyrrhiza, (Spanish and Russian), ipecacuanha, pareira, krameria.

Rhizomes. Aspidium, zingiber (Jamaican, East Indian and African), calamus, veratum, cypripedium, convallaria, triticum, sanguinaria, geranium, podophyllum valeriana, serpentaria; spigelia, hydrastis, cimicifuga, leptandra, gelsemium, berberis scopola, rheum, apocynum.

Tubers and Bulbs. Jalapa, aconitum, colchicum, scilla.

Woods. Quassia, hæmatoxylon, santalum rubrum,

Barks. Cinchona (Rubra et Flava), prunus virginiana, hamamelis, vilburnum prunifolium, viburnum opulus, rubus, quercus alba, granatum, frangula, rhamnus purshiana, xanthoxylum, mezereum, gossypium, euonymus, quillaja, ulmus, sassafras, cinnamomum (Ceylon, Saigon and cassia).

Leaves and leaflets. Pilocarpus, eucalyptus, uva ursi, senna (Alexandria and India), coca (Bolivian and Truxilla), belladonna, stramonium, hyoscyamus, digitalis, matico, salvia, hamamelis, eriodictyon, chimaphila, buchu (long and short).

Herbs and Flowers. Santonica, caryophyllus, calendula, cusso, arnica, matricaria, anthemis, rosa gallica, zea, chondrus, cannabis indica, scoparious, eupatorium, grindelia, lobelia, mentha piperita, mentha viridis, hedeoma, marrubium, scutellaria, chirata, sabina.

Fruits. Humulus, piper (longum, nigrum et album), cubeba, pimenta, rhus glabra, capsicum, colocynthis, cassia fistula, cardamomum, vanilla, coriandrum, conium, anisum, carum, fœniculum, (Roman and German), aurantii amari cortex, aurantii dulcis cortex, limonis cortex et succes, prunum, tamarindus (East and West Indian), ficus, sabal.

Seeds. Physostigma, amygdala (dulcis et amara), pepo, myristica, sinapis (alba et nigra), nux vomica, staphisagria, ricinus, tiglium,

Miscellaneous. Guarana, lactucarium, aloe (Socotrina, Barbadensis, et Capensis). kino (Malabar et Pallas), gambir, opium, elastica, manna, saccharum, acacia, tragacantha, mastiche, guaiacum, benzoinum, cambogia, asafœtida, scammonium, myrrha, copaiba, terebinthina, terebinthina canadensis, resina, pix liquida, styrax, balsamum peruvianum tolutanum, camphora, thymol, menthol, ergota (Spanish and German), sassafras medulla, galla (Aleppo et Chinensis), gossypium, purificatiom, lupulinum, lycopodium, amylum, maltum.

Besides the foregoing, a number of the more important unofficial drugs and the animal drugs will also be discussed.

2. Powdered Drugs — Mr. Butters and Assistant

One credit (nine hours lecture, twenty-seven hours laboratory)

Fourth quarter, second year.

Prerequisite, pharmacognosy 1.

This course consists of laboratory work and occasional lectures. The more important vegetable drugs are examined microscopically in powdered form. Especial attention is paid to the identification of unknown powders, and to the detection of the various forms of sophistication to which powdered drugs are subject

PHYSIOLOGY

Richard O. Beard, M.D., Professor of Physiology
M. R. Wilcox, M.D., Professor of Physiology
Julius Parker Sedgwick, B.S., M.D., Instructor in Physiological Chemistry

1. PHYSIOLOGY, ANATOMY AND HISTOLOGY PROFESSORS BEARD AND WILCOX

One credit (eighteen hours lecture and recitation) First quarter, second year

1. The work covers the study of the physiological properties of the cell, the nutritive media, the nervous mechanisms in general, muscular tissues, connective tissues and epithelial tissues. The subjects of anatomy and histology are touched upon sufficiently to lay the foundation for the proper understanding of physiological functions.

Special attention is directed to the action of drugs and their effects upon the various systems.

2. QUALITATIVE AND QUANTITATIVE URANALYSIS (Post-Graduate) PROFESSOR BEARD AND DR. SEDGWICK

One credit (nine hours lecture, eighteen hours laboratory) Seceond semester

Prerequisite, Physiology 1.

Lectures, recitations and laboratory work. The laboratory work includes the qualitative analysis of representative specimens of urine as regards their physical properties, inorganic and organic constituents, as well as the quantitative determination of chlorides, urea, ammonia, total nitrogen, sugar and albumin, together with the preparation of reagents.

3. EXPERIMENTAL PHYSIOLOGY (Post-Graduate) PROFESSORS BEARD AND WILCOX

Four credits (thirty-six hours lecture, seventy-two hours laboratory) Second semester

Prerequisite, physiology 2.

Laboratory work and demonstrations. A study of physiologic apparatus, electric stimuli and methods of experimentation; the demonstration and performance of experiments which illustrate physiologic function in the muscular, nervous, vascular respiratory and glandular systems; and the study of the cardiac areas, the heart and respiratory sounds, and of pulse tracings including training in the use of sphygmograph the stethoscope, phonendoscope, etc.

4. PHYSIOLOGICAL CHEMISTRY AND MICROSCOPY (Post-Graduate) PROFESSORS BEARD AND WILCOX AND DR. SEDGWICK

Eight credits (seventy-two hours lecture, one hundred forty-four hours laboratory) First semester

Prerequisite, physiology 3.

Laboratory work and demonstrations. A practical study of the several classes of proteids; of carbohydrates, fats, muscle and bone; of gastric juice, saliva, pancreaatic juice and bile in their respective digestions; of glycogen, and of blood lymph, chyle and milk. Microscopic study of the carbohydrates in vegetable and animal forms; of the physiologic emulsions of fat; of the crystalline waste, products, and of the physiologic conditions of the blood cells and of blood crystals. Practical instruction is given during this course in the enumerations of the blood cells, in the estimation of haemoglobin and of the corpuscles in mass, in the spectroscopic examination of the blood in the determination of blood tests, and in the use of polariscope.

MINNESOTA PHARMACY LAW

Several lectures elucidating the rights, duties, privileges and liabilities of pharmacists under the state law regulating the practice of pharmacy, are given by special ectures near the close of the second year.

SPECIAL LECTURES

From twelve to fifteen special lectures on subjects related to the practice of pharmacy are delivered by well-known pharmacists of the state at intervals during the college year.

LECTURE AND LABORATORY SCHEDULES

The work of the regular course for 1908-'09 will be somewhat augmented, but the herewith schedule of the past year will be adhered to as far as possible. The necessary changes will be posted on the college bulletin in September.

The college year is divided into four quarters, the first and second constituting the first semester, and the third and fourth the second semester. The college year covers nine full months or thirty-eight weeks. Each quarter consists of nine working weeks.

First Semester—Junior and Senior Schedule

		FIRST QUARTER								SECOND QUARTER							
	1909	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
JUNIOR	Mon.	Botany Laboratory			Pharmaceutical Chemistry	General Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
	Tues.	Botany Lecture	Pharm. Chem.			General Chemistry				Botany Laboratory			Pharm. Chem.	Qualitative Chemistry			
	Wed.	Botany Laboratory			Pharmat-ceutical Chem.	Chem. Recitation				Pharmaceutical Laboratory				Qualitative Chemistry			
	Thurs.	Botany Lecture	Pharm. Chem.			General Chemistry				Botany Laboratory			Pharm. Chem.	Qualitative Chemistry			
	Fri.	Botany Laboratory			Pharmaceutical Chem.	General Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
	Sat.	Make up Laboratory								Make up Laboratory							
SENIOR	Mon.	Materia Medica	U. S. P. Testing			Dispensing				Materia Medica	Pharmacognosy Laboratory			Pharmaceutical Laborat'ry			
	Tues.	U. S. P. Testing			Physiology	Dispensing				Pharmaceutical Laboratory				Mineralogy and crystallography			
	Wed.	Materia Medica	Organic Pharm-	Identification	Pharmacognosy Lecture	Dispensing				Materia Medica	Organic Pharm.	Identification	Pharmacognosy Lecture	Mineralogy and Crystallograhy			
	Thurs.	U. S. P. Testing				Dispensing				Pharmaceutical Laboratory				Pharmaceutical Laborat'ry			
	Fri.	Materia Medica	U. S. P. Testing		Physiology	Dispensing				Materia Medica	Pharmacognosy Laboratory			Pharmaceutical Laborat'ry			
	Sat.		Make up Laboratory							Make up Laboratory							

Second Semester—Junior and Senior Schedule

		THIRD QUARTER								FOURTH QUARTER							
	1910	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	11:30	11:30	1:30	2:30	3:30	4:30
JUNIOR	Mon.	Materia Medica	Botany Laboratory			Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Tues.	Pharm. Chem.	Pharmaceutical Laboratory			Organic Chemistry				Pharm. Chemistry		Pharmaceutical Laboratory		Organic Chemistry			
	Wed.	Materia Medica	Pharm.	Botany Lecture	Pharm. Chem.	Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Thur.	Pharm. Chem.	Pharmaceutical Laboratory			Organic Chemistry				Pharm. Chem.		Pharmaceutical Laboratory		Organic Chemistry			
	Fri.	Materia Medica	Botany Laboratory			Organic Chemistry				Materia Medica	Pharmacognosy Laboratory			Organic Chemistry			
	Sat.		Make up Laboratory								Make up Laboratory						
SENIOR	Mon.	Quantitative Chemistry				Pharmaceutical Laborat'ry				First Aids	Law			Pharmaceutical Laborat'ry			
	Tues.	Pharmacognosy Laboratory			Organic Pharm.	Pharmaceutical Laborat'ry				Organic Phramacy	New Remedies			Pharmaceutical Laborat'ry			
	Wed.	Quantitative Chemistry				Pharmaceutical Laborat'ry				Pharmacognosy Laboratory			Identification	Pharmaceutical Laborat'ry			
	Thurs.	Pharmacognosy Laboratory			Organic Pharm.	Pharmaceutical Laborat'ry				First Aids	Law			Pharmaceutical Laborat'ry			
	Fri.	Quantitative Chemistry				Pharmaceutical Laborat'ry				Pharmacognosy Laboratory			Identification	Pharmaceutical Laborat'y			
	Sat.	Make up Laboratory								Make up Laboratory							

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THE SCHOOL OF MINES

The School of Mines

FACULTY

Cyrus Northrop, LL.D., President

William R. Appleby, M.A., Dean and Professor of Metallurgy

Charles E. van Barneveld, B.A., Sc., E.M., Professor of Mining Engineering

Benjamin F. Groat, B.S., LL.B., Professor of Mechanics and Mathematics

Peter Christianson, B.S., E.M., Professor of Metallurgy

Elting H. Comstock, M.S., Professor of Mechanics and Mathematics

Edward P. McCarty, E.M., Assistant Professor of Mining

Levi B. Pease, M.S., Assistant Professor of Metallurgy

John J. Flather, Ph. B., M.E., Professor of Mechanical Engineering

George B. Frankforter, Ph. D., Professor of Chemistry

Christopher W. Hall, M.A., Professor of Mineralogy and Geology

Frederick S. Jones, M.A., Professor of Physics

William H. Kavanaugh, M.E., Professor of Experimental Engineering

William H. Kirchner, B.S., Professor of Drawing and Descriptive Geometry

Edward E. Nicholson, M.A., Assistant Professor of Chemistry

George D. Shepardson, M.A., M.E., Professor of Electrical Engineering

Charles F. Sidener, B.S., Professor of Chemistry

INSTRUCTORS AND ASSISTANTS

Charles P. Clarke, B.S., Instructor in Drawing

Francis C. Frary, M.S., Instructor in Chemistry

Frank F. Grout, M.S., Instructor in Mineralogy

Alois F. Kovarik, M.A., Instructor in Physics

Norman W. Rose, M.E., Instructor in Drawing

Frank B. Rowley, B.S., M.E., Instructor in Drawing

William T. Ryan, E.E., Instructor in Electrical Engineering

Charles F. Shoop, B.S., Instructor in Mechanical Engineering

ADMISSION

Examinations for admission will be held at the begining of the year. See calendar and program of examinations.

All candidates for admission must take entrance examinations in Algebra and Geometry to the extent indicated in syllabi, pages 14 and 15. These examinations will be held in Room 24, School of Mines Building.

No student will be registered for first semester's work after September 25th, 1909, or for second semester's work after February 12th, 1910.

All applicants should present themselves to the Dean of the School of Mines, Room 25, School of Mines Building, who will furnish them with application blanks and directions covering examinations and registration.

Women will not be admitted to any course offered in the School of Mines.

GENERAL REGULATIONS GOVERNING ADMISSION

I. Students will be admitted to the freshman class on passing the regular entrance examinations.

II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special permission of the Department of Mathematics.

III. Graduates of any Minnesota State high school will be admitted with out examination, except in Mathematics, provided—

(1) That the school maintain a full four-year course of high school work.

(2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.

IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to the committee not later than Tuesday of examination week.

V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examination in all subjects, as provided in sections I. and II., unless excused by vote of the faculty;

and persons wishing to present reasons for such excuse should report to the enrollment committee not later than Tuesday of examination week.

VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.

VII. Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four years' course, exclusive of the common school branches, conforming essentially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and, after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided—

(1) That the school be open to inspection at any time by the University:

(2) That it take such supplementary examinations as may be prescribed from time to time.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants coming from schools not included in any of the above classes must take the regular entrance examinations or present State High School Board certificates, and take examinations in entrance Mathematics.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing Tuesday, September 7th, in School of Mines Building, room 25 at 9 o'clock, a. m.

REQUIREMENTS FOR ADMISSION

For list and description of subjects accepted for admission see pages 68, 69 and 72.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work in this University, subject to the approval of the departments concerned. In bringing records from other institutions, the certificates must be on the official blanks of the institution granting the certificate, and should show:

1. The subjects studied and ground covered
2. The time spent upon each subject
3. In case of laboratory subjects, a concise statement of work done
4. The result—it is sufficient to state that the subjects were creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult the departments concerned in determining the credit to be given.

DAILY ROUTINE

The daily session is divided into eight recitation periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at 8:30 and closes at 12:35 o'clock. A general assembly of the faculty and students is held at 10:25 o'clock, at which there are brief and simple religious exercises. The noon hour extends from 12:35 to 2 o'clock. The afternoon session begins at 2:00 o'clock, and continues until 5:40. Work extends through six days of the week.

EXAMINATIONS

Students failing to receive a semester mark of 75 per cent in any subject shall have the privilege of a supplementary examination before the opening of the following year.

Each student must obtain from the registrar his yearly average in all subjects and present himself for supplementary examinations, according to the program given on page 3.

Students failing to receive a semester mark of 50 per cent in any subject shall not be allowed to pursue any dependent subject.

The faculty will exclude students from attending classes in any subject upon recommendation of the department concerned.

Students failing to pass supplementary examinations must register the next year for those subjects in which they have failed. They may take in addition other subjects appearing in courses of instruction, pages 33 to 40, with the exception of Mining and Metallurgical courses, based upon requirements of the various courses and daily program. They may also take certain electives in other colleges, provided suitable arrangements can be made.

All students must report in time to make suitable arrangements with departments concerned in case of conflicts in program.

No other supplementary examinations will be given. Students failing to report for supplementary examinations will be compelled to take work over in class as in case of failures.

Students failing to present themselves for final examination at the end of the first or second semester will be given zero on the examinations.

Students whose absences in either semester exceed four weeks in the aggregate are not permitted to take examinations without special permission of the faculty.

A fee of five dollars per subject is required for each special examination.

UNCLASSED STUDENTS

No unclassed students will be admitted to the School of Mines.

GRADUATION

Students completing courses of study to the satisfaction of the faculty are entitled to receive the appropriate degrees. Any person may undergo, at suitable times, examinations in any subject. If such person pass in all the studies and exercises of a course, he is entitled to the appropriate degree, provided, that at least one full year be spent at the University before such degree shall be granted, and provided, the examination in every case be held before a committee of the faculty appointed for that purpose.

THESES

Every member of the senior class is required to prepare a typewritten thesis which must be submitted for approval not later than April 9th. These must be handed in properly bound, together with original drawings, tracings, negatives and one set of clear blue prints therefrom, not later than April 30th.

The subject of the thesis will be the development, exploitation and equipment of a mining property or metallurgical plant. Considerable latitude is allowed in selecting conditions and location, subject, however, to the final approval of the professor in charge of the department.

The selection must be made and work must begin prior to the Christmas vacation. Students are expected to devote at least twelve hours a week to the preparation of their theses during the second semester.

Special Information

In the School of Mines there are two regular courses of study, viz. Mining Engineering, and Metallurgy, leading to the degree of Engineer of Mines (E. M.), and Metallurgical Engineer (Met. E.) respectively.

The degree of Met. E. may be conferred upon a candidate who received the degree of E. M. in four years, and vice versa, provided such candidate completes an additional year's work at the school and presents a suitable thesis.

Students in the College of Science, Literature and Arts, in the College of Engineering and Mechanic Arts, and in the School of Technical and Applied Chemistry, who contemplate taking a degree in this school after completing their course, are recommended to select their electives with reference to as full a preparation as possible for the technical work of the course they propose to enter.

FEES

A registration fee of fifteen dollars is required at the beginning of each semester from residents of the state, and thirty dollars from non-residents.

The various laboratory fees are as follows:

Chemical laboratory (Qualitative)	Per semester	$ 5.00
Chemical laboratory (Quantitative)	"	7.00
Mineralogical laboratory	"	3.00
Assaying laboratory	"	15.00
Experimental laboratory	"	6.00
Steam Laboratory	"	3.00
Electrical laboratory	"	5.00
Ore testing laboratory	"	10.00

The trip to the mines made by the junior class costs the student from one hundred to one hundred and seventy-five dollars.

Books cost about as follows:

Freshman year	$12.00 to $15.00.
Sophomore year	8.00 to 10.00
Junior year	18.00 to 25.00
Senior year	10.00 to 30.00

A number of books are recommended to the student, but the purchase of them is optional. The lower estimates given will cover the cost of books that must be purchased.

Each member of the freshman class must be provided with a set of draughting instruments. The necessary instruments will cost about fifteen dollars.

A number of valuable catalogs and pamphlets are loaned members of the senior class in the study of mechanics. A deposit of $3.00 shall be made with the Accountant by each member, to be refunded upon the return in good condition of all such matter.

SUMMARY OF EXPENSES

FRESHMAN YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
	$ 95.00

SOPHOMORE YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
	$ 54.00

JUNIOR YEAR

*Incidental fee	$ 30.00
Steam laboratory	3.00
Trip to the mines	$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
	$154 to $229.00

SENIOR YEAR

*Incidental fee	$ 30.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
	$ 93.00

*For non-residents the incidental fee is $60 per year.

Good board can be obtained at a cost varying from $2.50 to $4.00 per week. Room rent varies from $5.00 to $15.00 per month. With two occupying one room, the rent per student would be considerably lower.

ORGANIZATION

The organization of the School of Mines dates back to 1889, when the general faculty of the University recommended to the Board of Regents its establishment. In 1891 the legislature of the State of Minnesota voted an appropriation for establishing and equipping the school. Two annual appropriations have since been made for its support. The legislature of 1901 appropriated $47,500 for a new School of Mines building. In 1903 the legislature appropriated $25,000 for completing and equipping the School of Mines building, and in 1905 an additional sum was provided for equipment.

SCHOOL OF MINES BUILDING

The School of Mines building is designed to accommodate only the technical work of the School of Mines, as adequate building accommodations and equipment have already been furnished for chemistry, geology, mineralogy, drawing, and mechanical and electrical engineering. The building is 150 feet long by 65 feet wide. It is a brick building three stories high. The lower floor is occupied by the assaying and metallurgical laboratories; the second floor contains offices, two large lecture rooms, a department library, and a museum; the third floor provides two quiz rooms, a large, well lighted draughting room, a thesis room, a dark room and a blue print room. This building makes possible the development of the work already begun and offers facilities for more extended work along technical lines.

LOCATION

The University of Minnesota is located in the city of Minneapolis, on the east bank of the Mississippi river. The School of Mines has its buildings and laboratories on the same ground. Students of the School of Mines have, therefore, all the opportunities afforded by a large university.

Minneapolis is surrounded by and is in direct communication with several important mining and smelting districts. As the city is a railroad center, all possible transportation facilities are available.

FIELD WORK

Field work is conducted at the iron mines in the northern part of this state, in the copper and iron regions of Michigan, in the mines and smelters of Montana, Colorado, Utah and California, and in the coal mines of Pennsylvania.

At least one of these districts will be visited by each class, affording splendid opportunities for study and observation.

The field work in mining and metallurgy consists of one trip at the close of the Junior year. For details see pages 24 and 30.

Students must deposit with the **Accountant,** at least **two weeks** before time set for departure of class, a sum sufficient to cover following expense items:

1st. Board and lodging.
2nd. Necessary mine supplies.

Transportation and incidental expenses are not included in the above items and must be met individually.

A statement of expenditures will be rendered at the close of the work and any balance existing will be refunded.

The amount of deposit required will vary, according to the locality visited, and will be announced each year when arrangements for the trip are completed.

THE ELLIOT SCHOLARSHIP LOAN FUND

To fulfill the wish of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of $5,000 was placed in the hands of the Board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest, at the earliest convenience of the recipients.

LIBRARY

The library consists of about two thousand five hundred volumes. This number represents only those works that treat directly of mining and metallurgical subjects.

The school has a complete set of the leading mining and metallurgical journals, and other similar books of reference. The leading periodicals are accessible to all. Constant references in lectures compel the student to keep himself well informed as to the latest methods, machinery and changes in practice going on in his special line of work.

In addition to the above, many thousand volumes on chemistry, mineralogy and geology complete a most valuable working and reference library. A card index is kept of all articles of value and interest appearing in the leading periodicals.

PHOTOGRAPHY

Photographs of surface and underground appliances, metallurgical plants, copies of drawings and other photographs are indispensable to the study of mining and metallurgy. With the report of his field work every student is expected to present photographs, as well as sketches, of various objects under consideration. There is also a very complete set of lantern slides illustrating the principal methods of underground workings and metallurgical plants, at home and abroad. Several hundred slides have been made in the department's laboratory which bear directly on the work done in Minnesota and the neighboring northwest. Many valuable photographs are constantly being made. Blue prints of these are given students as illustrations. Much time is thus saved, usually spent in making sketches and diagrams.

CLASSIFICATION OF SUBJECTS

The work falls under the following subdivisions, supplemented by thorough courses in mechanics, mathematics, physics, chemistry, mineralogy and geology:

(A) **Assaying**—to determine if ore has value for treatment. (B) **Mining engineering**—to furnish material for treatment. (C) **Ore testing**—To determine best method of treatment. (D) **Ore dressing**—furnishing products for metallurgical treatment. (E) **Metallurgy**—smelting and refining ores and ore dressing products; reduction to metals.

DEPARTMENT OF MINING ENGINEERING

Mining engineering extends through sophomore, junior and senior years. The subjects given together with the sequence necessary, are treated in the accompanying outline of the course.

Until the first semester of the junior year, the course consists of lectures and recitations only. In the subsequent work, text-books are used in connection with the lectures.

In the senior year, problems in hoisting, hauling, pumping, ventilation and similar subjects become an important part of the work.

DESIGNS AND SPECIFICATIONS

The student makes in connection with his thesis work working drawing of mine cars, skips and other parts of mine equipment that are usually designed and made at the mine.

MINE SURVEYING

The work in surveying is given in the first semester of junior year and is designed solely for mining engineers.

The work begins with the elements of plane surveying with special reference to the computations necessary, followed by the higher theoretical work in plane surveying and its application to the problems met in underground surveying. This is followed by a course in mine mapping during the second semester of junior year and six weeks of field work as follows: Beginning with the first Monday in May the class meets daily for the practice of plane surveying at some readily accessible locality (to be announced each year). The duration of this course is four weeks, eight hours a day.

The students are divided into squads of two or four, and each is required to complete satisfactorily the following exercises and surveys:

1. Chaining
2. Compass reading
3. Adjustment of hand levels and practice in leveling
4. Adjustment and use of wye levels
5. Adjustment of mining transit
6. Reading angles
7. Traverse with steel tape
8. Azimuth traverse with stadia
9. Determination of meridian, latitude and time by solar and stellar observations

10. Survey of mining claim according to the regulations of the U. S. Government
11. Measurement of earthwork
12. Laying out railroad tangents, curves and crossings

Each squad must provide itself with a 6-foot steel tape, graduated to hundredths.

After the completion of this work from ten days to two weeks are spent in the actual underground survey of a mine or part of a mine in some mining district in Minnesota or Michigan.

A full equipment of surveying instruments of the latest and best makes is furnished each squad for this work.

Students who furnish satisfactory evidence of proficiency in this work may be given credit therefor. The department, however, reserves the right in any case to require such students to take a theoretical or a practical examination or both.

FIELD WORK IN MINING

During the second semester arrangements are made by the department with various representative mines in the West to give students an opportunity to gain practical underground mining experience, and at least six weeks of such work is required of the student during the vacation following junior year. This work must be done at a mine selected by the department (the preference of the student will be consulted in so far as possible) subject to the following conditions:

Upon the termination of the metallurgical work about June 20th (this work follows immediately upon completion of the mine surveying) the student will report to the superintendent of the particular mine to which he is assigned. On no account is he to report later than July 1st. For fifteen days he will be given the freedom of the mine for general observation work. For the remainder of the summer he must engage in regular miner's work for which he may be paid current wages.

Four weeks of such work will be REQUIRED. He will be subject to the regular mine discipline. In case he is discharged no attempt will be made by the department to investigate, but the student will be allowed to make up the work at the end of senior year. His degree will be withheld until all work is completed.

In the event of unforseen contingencies, such as accidents, the sudden closing down of a mine, etc., the work must be made up at the first opportunity.

The student must keep a diary and record therein, in minute detail, all work done, his observations, sketches, etc. This diary shall be handed in to the department not later than Sept. 10th of each year, together with an affidavit to the effect that it is authentic and is a true record of the work done by him. Two weeks prior to the opening of the second semester of senior year the student must submit a typewritten report fully illustrated with sketches drawn to scale, covering all the mining and milling operations together with details of plant and equipment.

ORE DRESSING

The lectures and recitations in ore dressing extend through the second semester of the junior year, and comprise the detailed study of ore dressing and concentrating machinery, together with the study of typical combinations of dressing machines as found in the several mining districts of the United States.

In connection with the theoretical work, the ore dressing and testing plant of the school is utilized for practical illustrations.

Course in Mining Engineering

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Professor Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

Chemistry 2, eight hours, Assistant Professor Nicholson and Mr. Frary
Descriptive Geometry 4, two hours, Professor Kirchner
Drawing 2, four hours, Professor Kirchner and Assistants
Mathematics 2, five hours, Professor Comstock
Metallurgy 1, twelve hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
Mineralogy 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 3, eight hours, Professor Sidener
Drawing 5, eight hours, Professor Kirchner and Assistants
Mathematics 3, five hours, Professor Groat and Professor Comstock
Metallurgy 3, three hours, Professor Christianson
Physics 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER

Chemistry 5, eight hours, Professor Sidener
Drawing 6, four hours, Professor Kirchner and Assistants
Mathematics 4, five hours, Professor Groat and Professor Comstock
Metallurgy 4, three hours, Professor Christianson
Mining 1, four hours, Assistant Professor McCarty
Physics 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

Geology 3, two hours, Professor Hall
Experimental Engineering 1, four hours, Mr. Shoop
Geology 9, four hours, Mr. Grout
Mechanics 5, five hours, Professor Groat

Metallurgy 5, four hours, Assistant Professor Pease
Mining 2, five hours, Professor van Barneveld
Mining 3, five hours, Assistant Professor McCarty

SECOND SEMESTER

Geology 10, four hours, Mr. Grout
Experimental Engineering 2, four hours, Mr. Shoop
Mechanics 6, five hours, Professor Groat
Metallurgy 6, four hours, Assistant Professor Pease
Mining 2, five hours, Professor van Barneveld
Mining 5, five hours, Assistant Professor McCarty
Mining 8, six hours, Assistant Professor McCarty
Mechanical Engineering 18, two hours, Professor Flather
Field work. Months of May, June, July and August

Mine Surveying 7, beginning about May 1st. Six weeks	Professor van Barneveld Assistant Professor McCarty
Metallurgy 8, one week	Professor Appleby Professor Christianson Assistant Professor Pease
Practical Mining 9, six weeks	Professor van Barneveld Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

Chemistry 14, eight hours, Professor Sidener
Electrical Engineering 4, six hours, Mr. Ryan
Geology 12, four hours, Professor Hall
Mechanics 7, five hours, Professor Groat
Metallurgy 2, ten hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
Mining 4, five hours, Professor van Barneveld
Mining (Thesis) 10, two hours, Professor van Barneveld and Assistant

SECOND SEMESTER

Chemistry 18, eight hours, Professor Sidener
Experimental Engineering 9, four hours, Professor Kavanaugh
Geology 13, four hours, Professor Hall
Mechanics 8, three hours, Professor Groat
Mining 4, five hours, Professor van Barneveld
Mining (Designs and Specifications) 6, eight hours, Professor van Barneveld and Assistant
Mining (Thesis) 10, four hours, Professor van Barneveld and Assistant

DEPARTMENT OF METALLURGY

This department is well supplied with representative ores of all the most important metals, drawings of furnaces, models and samples of all the different furnace products. The lectures treat of all the principal methods now in use.

The practical work consists in visits to smelting and refining works which are accessible. The work in metallurgy extends through three years.

ASSAYING

The lectures treat of and describe apparatus, reagents, assay furnaces, fuels, etc., in connection with this subject. The principles of assaying and sampling are fully explained. A collection of representative ores of various metals with a collection of corresponding slags are shown, and instruction is given as to nature and quantity of fluxes. Special and rapid methods of testing slags and metallurgical products as employed in western smelting works are emphasized.

The laboratory course includes preparing and testing reagents, making cupels, etc., and assaying samples of ore, furnace and mill products, and bullion; different charges are tried and practical conclusions drawn.

Great importance is attached to the work in the laboratory. A large well ventilated furnace room in which are located muffle and crucible furnaces, and another room of similar dimension equipped with desks, pulp and bead balances, afford accommodations to a large number of students. Ores of various metals of known value are given the students, who are required to make up the necessary charges and submit their reports in detail. This work is offered to students completing the necessary courses in mineralogy and chemistry.

The Assay Laboratories are located in the School of Mines Building and consist of:

1st. Preparation room. This room is 62 feet long by 36 feet wide and accommodates 66 students. Here samples and reagents are weighed preparatory to assaying. Each student is furnished with a complete set of apparatus, including a pulp balance for individual use. All operations are therefore conducted with the greatest economy of time and entirely apart from the furnace room. The separation of the preparation room from the furnace room is of greatest importance. Nearly all ores are crushed and pulverized by suitable machines run by electric motors. Students are compelled to pulverize by hand a minimum number of samples, thereby saving much time for extended and advanced work in special lines.

2nd. Furnace room. This room is 60 feet long by 42 feet wide. The high ceiling and special ventilation provided for this room make it a most comfortable assay furnace room. It provides for the accommodation of twelve double-decked muffle furnaces, twenty-four crucible furnaces and twelve gasoline furnaces. After the sample has been placed in a suitable vessel for fusion, it is taken to the furnace room, which communicates directly with the preparation room.

3rd. Balance room. This room is 31 feet long by 16 feet wide. In this room are various types of balances for accurately weighing gold and silver beads and bullion. The room is specially lighted by electric cove lights from the ceiling. The balances are placed on heavy brick piers which are independent of the walls of the building.

ORE TESTING

The lectures treat of the use and purposes of all the machinery connected with the subject, supplemented with detail drawings.

There are complete testing works connected with the department where the student may see the working of, and handle for himself, crushers, rolls, Huntington mill, concentrating machinery, such as vanners, buddles, jigs, pan for amalgamation, settlers, reverberatory furnaces for oxidizing and oxidizing-chloridizing roasts, leaching and chlorination plants, as well as sizing apparatus and hydraulic separators. Sufficiently large amounts of ore are given to make the necessary tests upon the different machines and the students report the best method of treatment. The first semester of the senior year is devoted to instruction and laboratory work, and is required of students both in mining and metallurgy.

The ore testing works meet educational as well as commercial needs.

Educational. The ore testing plant acquaints the student with the construction and manipulation of the principal typical machines used in the leading ore dressing establishments of the country. It is here that students in mining and metallurgical engineering get the requisite practical experience. They handle all machines and operate on sufficiently large amounts of material to determine the methods best suited to a given ore to extract the largest amount of metal with the least possible loss.

Commercial. Ore testing works are an important factor in mining and metallurgical projects. The commercial object is to determine the best method of treating a given ore so as to yield the largest percentage of the metal it contains at the least possible cost. Samples varying from 500 pounds to car load lots can be treated by various methods.

The ore testing works are located on the east bank of the Mississippi between the Great Northern and Northern Pacific railroads. Located at this point on the University campus, it offers the very best facilities for both educational and commercial purposes.

As the funds appropriated for the erection of such a plant were sufficient to purchase only the necessary machinery, the business men of Minneapolis generously provided a suitable building. This building, 94x66 feet, is built of brick and stone.

Machinery. The plant contains all the machinery necessary to illustrate the various processes of ore testing, viz.: A Bridgman mechanical sampler, size B; a link belt bucket elevator; a pulley feeder complete; a pair of 12½x12 geared rolls complete; a four compartment spitzkasten; a three compartment Hartz jig; a Collum jig complete with cone for driving; a three and a half foot Huntington mill complete; a three stamp mill, 275-pound stamps; a five stamp mill, 850-pound stamps; a Challenge automatic feeder for five-stamp battery; a suspended Challenge feeder for three-stamp battery; a Tulloch feeder for Huntington mill; a single deck buddle, twelve feet in diameter; a four-foot plain belt Frue vanner; a Cammett concentrator; a Hooper pneumatic concentrator; a Century drop motion jig; a three-foot amalgamating pan; a five-foot settler; a Bruckner roasting furnace, with fire box on wheels; a chlorination barrel; a battery tightener; a two-horse power vertical boiler; a steam drying pan; three trommels, with, driving arrangement and gears; a one thousand pound Reedy elevator, complete with worm gear; two overhead crawls, each with eighty-foot track; one-ton pulley block; a quarter-ton pulley block; a scoop car, with flat wheels; two twenty-horse power electric motors; three MacDermott automatic samplers, etc.

FIELD WORK IN METALLURGY

At the end of junior year opportunity is given the student to study metallurgical operations at one or more smelting works. This work will begin about June 15th. Not over one week's time will be devoted to this work. The student must keep a diary and note in detail all work done, including sketches, etc. This diary must be submitted to the department not later than Sept. 10th before registering for senior year.

Two weeks prior to the opening of the second semester senior year, the student must submit a type written report fully illustrated with sketches drawn to scale covering work completed in the field.

Course in Metallurgy

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Professor Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

CHEMISTRY 2, eight hours, Assistant Professor Nicholson and Mr. Frary
DESCRIPTIVE GEOMETRY 4, two hours, Professor Kirchner
DRAWING 2, four hours, Professor Kirchner and Assistants
MATHEMATICS 2, five hours, Professor Comstock
METALLURGY 1, twelve hours, Professor Appleby, Professor Christianson and Assistant Professor Pease
MINERALOGY 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

CHEMISTRY 3, eight hours, Professor Sidener
DRAWING 5, eight hours, Professor Kirchner and Assistants
MATHEMATICS 3, five hours, Professor Groat and Professor Comstock
METALLURGY 3, three hours, Professor Christianson
PHYSICS 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER

CHEMISTRY 5, eight hours, Professor Sidener
DRAWING 6, four hours, Professor Kirchner and Assistants
MATHEMATICS 4, five hours, Professor Groat and Professor Comstock
METALLURGY 4, three hours, Professor Christianson
MINING 1, four hours, Assistant Professor McCarty
PHYSICS 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

GEOLOGY 3, two hours, Professor Hall
GEOLOGY 9, four hours, Mr. Grout
EXPERIMENTAL ENGINEERING 1, four hours, Mr. Shoop
MECHANICS 5, five hours, Professor Groat

METALLURGY 5, four hours, Assistant Professor Pease
MINING 2, five hours, Professor van Barneveld
MINING 3, five hours, Assistant Professor McCarty

SECOND SEMESTER

GEOLOGY 10, four hours, Mr. Grout
MECHANICS 6, five hours, Professor Groat
EXPERIMENTAL ENGINEERING 2, four hours, Mr. Shoop
METALLURGY 6, four hours, Assistant Professor Pease
MINING 2, five hours, Professor van Barneveld
MINING 5, five hours, Assistant Professor McCarty
MINING 8, six hours, Assistant Professor McCarty
MECHANICAL ENGINEERING 18, two hours, Professor Flather
FIELD WORK. Months of May, June, July and August.

Mine Surveying 7, Beginning about May 1st. Six weeks	Professor van Barneveld Assistant Professor McCarty
Metallurgy 8, one week	Professor Appleby Professor Christianson Assistant Professor Pease
Practical Mining 9, six weeks	Professor van Barneveld Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

CHEMISTRY 14, eight hours, Professor Sidener
ELECTRICAL POWER, ELECTRICAL ENGINEERING 4, six hours, Mr. Ryan
GEOLOGY 12, four hours, Professor Hall
MECHANICS 7, five hours, Professor Groat
MINING 4, five hours, Professor van Barneveld
METALLURGY 2, ten hours, Professor Appleby, Professor Christianson and Assistant Professor Pease

SECOND SEMESTER

CHEMISTRY 18, eight hours, Professor Sidener
CHEMISTRY 16, six hours, Professor Frankforter and Mr. Frary
EXPERIMENTAL ENGINEERING 9, four hours, Professor Kavanaugh
MECHANICS 8, three hours, Professor Groat
METALLURGY 7, three hours, Professor Christianson
METALLURGY 9, four hours, Professor Appleby and Assistants
MINING 4, five hours, Professor van Barneveld

Departments of Instruction

CHEMISTRY

George B. Frankforter, Ph.D., Professor of Chemistry
Charles F. Sidener, B.S., Professor of Chemistry
Edward E. Nicholson, M.A., Assistant Professor of Chemistry
Francis C. Frary, M.S., Instructor in Chemistry

1. General and Qualitative Analysis — Professor Nicholson and Mr Frary

Five credits, (two lectures, six laboratory hours per week) First semester
Required of freshmen

The course includes special general chemistry and the reactions of the metals as applied to their separation and identification.

2. Qualitative Analysis — Professor Nicholson and Mr Frary

Five credits (two lectures, six laboratory hours per week) Second semester
Open to students completing 1. Required of freshmen

The work in this course will include examination of alloys, minerals, slags and other compounds.

Quantitative Analysis — Professor Sidener and Assistants

Five credits (two lectures, six laboratory hours per week) First semester
Open to students completing 2. Required of sophomores

The course includes an introduction to quantitative and a beginning of gravimetric analysis.

5. Volumetric Analysis — Professor Sidener and Assistants

Five credits (two lectures, six laboratory hours per week) Second semester
Open to students completing 3. Required of sophomores

The course includes an introduction to volumetric determinations with a discussion of standard solutions and the necesary stoicheiometric calculations.

14. Special Problems — Professor Sidener and Assistants

Five credits (two lectures, six laboratory hours per week) First semester
Open to students completing 5. Required of seniors

The course includes the working out of various mineralogical, technological and metallurgical problems, with work on ores of base metals, limestones, slags, etc.

16. Electro-Chemical Analysis — Professor Frankforter and Mr. Frary

Four credits (two lectures, four laboratory hours per week) Second semester
Open to students completing 14. Required of seniors in Metallurgy

The course includes the qualitative and quantitative separation of metals by electrolysis.

Note. A credit is one recitation or lecture hour per week, per semester.
Two laboratory hours are equal to one credit.

18. **Iron and Steel Analysis** Professor Sidener and Assistants
Five credits (two lectures, six laboratory hours per week) Second semester
Open to students completing 14. Required of seniors

The course includes the rapid determination of iron, by the various methods as well as the determination of associated elements, sulphur, phosphorus, silicon, manganese, carbon and others.

DRAWING AND DESCRIPTIVE GEOMETRY

William H. Kirchner, B.S., Professor of Drawing and Descriptive Geometry
Frank B. Rowley, B.S., M.E., Instructor in Drawing
Norman W. Rose, M.E., Instructor in Drawing
Charles P. Clarke, B.S., Instructor in Drawing

1. **Drawing** Mr. Rose, Mr. Clarke and Mr. Rowley
Three credits (six laboratory hours per week) First semester
Required of freshmen

The elements of general drafting, mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.

Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working drawings.

2. **Drawing** Mr. Rose and Mr. Rowley
Two credits (four laboratory hours per week) Second semester
Open to students completing 1. Required of freshmen
Continuation of Course 1 as outlined above.

3. **Descriptive Geometry** Professor Kirchner
One credit (one recitation per week) First semester
Required of freshmen

Projection—central and special cases, principles and applications, representation of lines, planes, and solids, and of their relations; tangencies, intersections and developments. Recitations, lectures and solution of problems.

4. **Descriptive Geometry** Professor Kirchner
Two credits (two recitation hours per week) Second semester
Open to students completing 3. Required of freshmen
Continuation of Course 3 as outlined above.

5. **Drafting** Professor Kirchner and Assistants
Four credits (eight laboratory hours per week) First semester
Open to students completing 2 and 4. Required of sophomores

Graphics, machine drafting, structural drafting and topography. Instruction in drafting room methods.

6. **Drafting** Professor Kirchner and Assistants
Two credits (four laboratory hours per week) Second semester
Open to students completing 5. Required of sophomores
Continuation of Course 5 as outlined above.

ELECTRICAL ENGINEERING

GEORGE D. SHEPARDSON, M.A., M.E., Professor of Electrical Engineering
WILLIAM T. RYAN, E.E., Instructor in Electrical Engineering

4. **ELECTRIC POWER** — MR. RYAN
Three credits (one lecture, four laboratory hours per week) — First semester
Open to students completing Physics 1. Required of seniors
Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting.

EXPERIMENTAL ENGINEERING

WILLIAM H. KAVANAUGH, M.E., Professor of Experimental Engineering
CHARLES F. SHOOP, B.S., Instructor in Experimental Engineering

1. **STRENGTH OF MATERIALS** — MR. SHOOP
Two credits (four laboratory hours per week) — First semester
Open to students completing Mechanics 5. Required of juniors
Laboratory work investigating the strength and physical qualities of iron, steel, brass, copper, belting, chains, beams, brick and stone.

2. **STEAM LABORATORY** — MR. SHOOP
Two credits (four laboratory hours per week) — Second semester
Open to students taking Mechanical Engineering, 18. Required of juniors.
Exercises in valve setting, indicator practice, calibration of steam gauges, efficiency of screws and hoists.

9. **EXPERIMENTAL LABORATORY** — PROFESSOR KAVANAUGH
Two credits (four laboratory hours per week) — Second semester
Open to students completing 2. Required of seniors
Hydraulic measurements. Calibration of weirs, nozzles, meters and other hydraulic apparatus, calorimetry; tests of pumps, engines and boilers.

MINERALOGY AND GEOLOGY

CHRISTOPHER W. HALL, M.A., Professor of Mineralogy and Geology
FRANK F. GROUT, M.S., Instructor in Mineralogy

1. **GENERAL MINERALOGY** — MR. GROUT
Six credits (four lectures, four laboratory hours per week) — First semester
Required of freshmen
The physical and chemical characters of minerals, a study of the native elements and the ores of the common metals; the occurence and association of economic minerals.

Descriptive mineralogy and classification; rock-forming minerals; genetic relationship and distribution.

Laboratory work consists of tests illustrating the range of minerals and the application of chemical and blowpipe analyses to the determination of species; introduction to the methods of quantitative blowpipe analysis; special topics; reference reading and discussions.

2. PHYSICAL MINERALOGY — MR GROUT

Three credits (two lectures, two laboratory hours per week) — Second semester

Open to students completing 1. Required of freshmen

An introduction to crystallography; physical characters of greatest service in rapid determination. Hand specimen practice preparatory to rock study.

3. PHYSICAL GEOLOGY — PROFESSOR HALL

Two credits (two lectures per week) — First semester

Open to students completing 2. Required of juniors

(1) Geodynamics, discussing the atmosphere, water, terrestrial heat, plants and animals as geological agents. (2) Structural geology, explaining stratification, displacements, dislocations, fractures, induced rock-structures and mineral veins in their relation to the arrangement of materials in the earth. (3) Physiographic geology, pointing out the more prominent earth features and discussing their origin, significance and the agencies affecting them. Field excursions are required. Scott's Introduction.

9. ELEMENTS OF ROCK STUDY — MR. GROUT

Two credits (four laboratory hours per week) — First semester

Open to students completing 3. Required of juniors

Structures, textures, mineral and chemical composition of rocks.

A practical study of rock types, with laboratory and field practice.

A study of their origin, occurrence, variation, and alteration, with view to accurate description. Introduction to the use of the microscope. Kemp's Hand Book of Rocks, and reference reading.

10. PETROGRAPHY — MR. GROUT

Two credits (four laboratory hours per week) — Second semester

Open to students completing 9. Required of juniors

The application of optical study of minerals to the description of crystalline rocks. Rock structures as seen with microscope. Alteration of rocks. The stratigraphic relation of rocks, and an examination of some Minnesota groups of crystalline rocks. Preparation of material for microscopic study. Luquer Minerals in Rock Sections, and reference readings.

12. ORE DEPOSITS — PROFESSOR HALL

Four credits (four lectures per week) — First semester

Open to students completing 10. Required of seniors

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations. A description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead and zinc. Kemp's Ore Deposits.

13. SPECIAL PROBLEMS — PROFESSOR HALL

Two credits (four laboratory hours per week) — Second semester

Open to students completing 12. Required of seniors in mining

The investigation of problems, involving the field and laboratory work of some particular formation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field; keeping of notebook, preparation of geological maps, profiles and sections will be taught.

MECHANICS AND MATHEMATICS

B. F. Groat, B.S., LL.B., Professor of Mechanics and Mathematics
Elting H. Comstock, M.S., Professor of Mechanics and Mathematics

1. Algebra and Trigonometry — Professor Comstock
Five credits (five recitation hours per week) — First semester
Required of freshmen

Logarithms, rational integral functions, factors and roots of general quadratic, factor and remainder theorems, factors and values of functions, graphs, progressions and notation, convergence, divergence, equivalence, exponential theorem, logarithmic series, summation of series, determinants; trigonometric ratios, right triangles, general definitions of trigonometric functions, analytic relations, addition formulas, etc., trigonometric equations, oblique triangles, spherical formulas and solution of spherical triangles.

2. Algebra and Analytic Geometry — Professor Comstock
Five credits (five recitations per week) — Second semester
Open to students completing 1. Required of freshmen

Development of functions and undetermined coefficients, cube roots of unity, derived functions, theory of equations, permutations and combinations, probabilities; systems of co-ordinates, loci, straight line, transformations, equations of the conics, properties of the conics.

3. Analytic Geometry and Calculus — Professor Comstock
Five credits (five recitations per week) — First semester
Open to students completing 2. Required of sophomores

General equation of second degree, higher plane curves, co-ordinates in space, point, plane, straight line, quadric surfaces; nature of differentiation, elementary forms, geometric applications, rates, successive differentiation, maxima and minima, elementary integration, expansion of functions, indeterminate forms, partial derivatives, change of variable, applications to analytic geometry.

4. Calculus — Professor Comstock
Five credits (five recitations per week) — Second semester
Open to students completing 3. Required of sophomores

Applications continued, rational fractions, rationalization, formulas of reduction, multiple integration, various systems of co-ordinates, approximate integration, hyperbolic functions, some differential equations of mechanics; least squares; slide rule.

5. Statics and Mechanics of Materials — Professor Groat
Five credits (five recitations and lectures per week) — First semester
Open to students completing 4 and Physics 1. Required of juniors.

Mathematical conditions of equilibrium, frames, theory of elasticity, beams, shafts, columns, boiler plates, etc.

6. Kinetics and Hydraulics — Professor Groat
Five credits (five recitations and lectures per week) — Second semester
Open to students completing 5. Required of juniors

Motion of rigid bodies; numerous problems in work, power, energy, friction and hydraulics.

7. Water Power — Professor Groat
Five credits (five recitations and lectures per week) — First semester
Open to students completing 6. Required of seniors

Estimation of power to be developed at a power site. Dams. Riparian rights. Number and type of units to install. Speed control. Power houses. Appendages. Transmission.

8. THERMODYNAMICS PROFESSOR GROAT
Three credits (three recitations and lectures per week) Second semester
Open to students completing 7. Required of seniors
Properties of gases. Steam engine. Gas engine. Steam and gas turbines. Power plants. Pumping.

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.E., Professor of Mechanical Engineering

18. STEAM ENGINE PROFESSOR FLATHER
Two credits (two lectures per week) Second semester
Open to students completing Mechanics 5. Required of juniors
Mechanics of the steam engine. Work in cylinder; effect of reciprocating parts; steam distribution. Mechanism of steam engines. A study of the details of modern steam engines. Valve and valve gears. A study of the slide valve, link motions and other reversing gear; automatic cut-off gears and the Zeuner diagrams. The steam engine indicator. Principles and operation of the instruments, indicator riggings indicator cards, compounding.

METALLURGY

WILLIAM R. APPLEBY, M.A., Professor of Metallurgy
PETER CHRISTIANSON, B.S., E.M., Professor of Metallurgy
LEVI B. PEASE, M.S., Assistant Professor of Metallurgy

1. ASSAYING PROFESSOR APPLEBY AND ASSISTANTS
Eight credits (four lectures and eight laboratory hours per week)
Second semester
Open to students completing Mineralogy 1. Required of freshmen
Determination of values of ores, metallurgical products and bullion.

2. ORE TESTING PROFESSOR APPLEBY AND ASSISTANTS
Six credits (two lectures and eight laboratory hours per week) First semester
Open to students completing 1 and Mining 5. Required of seniors
Determination of methods of ore treatment, stamping, concentration, cyanidation, roasting, chlorination, lixiviation and amalgamation.

3. GENERAL METALLURGY AND METALLURGY OF IRON PROFESSOR CHRISTIANSON
Three credits (three lectures per week) First semester
Open to students completing 1. Required of sophomores
Including the subjects of combustion, fuels, refractory materials and furnaces. Lectures and recitations on metallurgy of iron.

4. METALLURGY OF WROUGHT IRON AND STEEL PROFESSOR CHRISTIANSON
Three credits (three lectures per week) Second semester
Open to students completing 3. Required of sophomores

Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. **METALLURGY OF THE BASE METALS** — ASSISTANT PROFESSOR PEASE
Four credits (four lectures per week) — First semester
Open to students completing 4. Required of juniors
Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved in refining methods.

6. **METALLURGY OF THE PRECIOUS METALS** — ASSISTANT PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 5. Required of juniors
Gold, silver and platinum. Methods and principle of cyanidation, chlorination, amalgamation and lixiviation as applied to the treatment of the above.

7. **ELECTRO-METALLURGY** — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — Second semester
Open to students completing 6. Required of seniors in Metallurgy
This course considers the treatment of ores by electricity, as well as electrolytic separation and refining of metals.

8. **FIELD WORK IN METALLURGY** — PROFESSOR APPLEBY AND ASSISTANTS
Two credits (eight hours per day in field for seven days)
June following second semester
Open to students completing 6. Required of juniors
Study of metallurgical operations at smelters and mills. Detail report is required covering plants visited.

9. **THESIS AND SPECIFICATIONS** — PROFESSOR APPLEBY AND ASSISTANTS
Four credits (four hours, conferences and laboratory) — Second semester
Open to students completing 8. Required of seniors in Metallurgy
Detail investigations of ore treatment, with report including designs and specifications for suitable plants.

MINING ENGINEERING

CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., Professor of Mining Engineering

EDWARD P. MCCARTY, E.M., Assistant Professor of Mining

1. **MINING** — ASSISTANT PROFESSOR MCCARTY
Four credits (four lectures per week) — Second semester
Open to sophomores in regular standing. Required of sophomores.
Explosives, blasting, air compressors and quarrying.

2. **MINING** — PROFESSOR VAN BARNEVELD
Five credits (five lectures per week) — First and second semester
Open to those who have completed 1. Required of juniors
Mode of occurrence of ore bodies; prospecting, shaft-sinking, tunneling, drifting, stoping, timbering. Methods of metal mining. Methods of coal mining. Hydraulic mining.

3. **MINE SURVEYING** — ASSISTANT PROFESSOR MCCARTY
Five credits (five lectures per week) — First semester
Open to those who have taken mathematics 1, 2, 3 and 4, and mining 1.
Required of juniors
Computations, platting and problems with special reference to mine surveying.

4. MINING AND MINING ENGINEERING PROFESSOR VAN BARNEVELD
Five credits (five lectures per week) First and second semester
Open to those who have completed mining 2 and 3. Required of seniors

Mine management. The examination of a mining property. Sampling ore reserves, etc. Mine accounts. Mine accidents. Mining law. Mining machinery, underground transportation, hoisting, pumping and ventilation. Electricity applied to mining.

5. ORE DRESSING ASSISTANT PROFESSOR McCARTY
Five credits (five lectures per week) Second semester
Open to those having completed sophomore work. Required of juniors

Mechanical preparation of ore for the market, for metallurgical treatment, etc.

6. DESIGNS AND SPECIFICATIONS PROFESSOR VAN BARNEVELD AND ASSISTANT
Four credits (eight laboratory hours per week) Second semester
Open only to seniors in regular standing. Required of seniors

Designs of mine cars, skips, head-frames, etc., in connection with thesis work.

7. FIELD WORK PROFESSOR VAN BARNEVELD AND ASSISTANT
Eight credits (eight hours a day for six weeks) Second semester
Open to those who have completed mining 3. Required of juniors

Practice in plane surveying during month of May. Practice in underground mine surveying during first two weeks of June.

8. MINE-MAPPING ASSISTANT PROFESSOR McCARTY
Three credits (six laboratory hours per week) Second semester
Open to those who have completed 3. Required of juniors

9. PRACTICAL MINING PROFESSOR VAN BARNEVELD AND ASSISTANT
Eight credits (eight hours per day, six weeks) Summer vacation
Open to those who have completed 1, 2, 3, 7 and 8. Required of juniors

Study of mining operations. Mine plant and equipment and practical mining work at a mine to be selected by department during months of July and August.

1. THESIS PROFESSOR VAN BARNEVELD AND ASSISTANT
Two and four credits (two and four hours conferences) First and second semester
Open only to seniors in regular standing. Required of seniors.

Conference with individual students. This work is based upon a review of the preceding technical work and field work.

PHYSICS

FREDERICK S. JONES, M.A., Professor of Physics
ALOIS F. KOVARIK, M.A., Instructor in Physics

1. GENERAL PHYSICS PROFESSOR JONES AND MR. KOVARIK
Four credits (four lectures and recitations per week) First and second semester
Open to students completing mathematics 2. Required of sophomores
Recitations and experimental lectures.

K

THE SCHOOL OF CHEMISTRY

School of Chemistry

FACULTY

Cyrus Northrop, LL. D., President
George B. Frankforter, M. A., Ph. D., Dean and Professor of Chemistry
William R. Appleby, M.A., Professor of Metallurgy
George N. Bauer, Ph. D., Professor of Mathematics
William E. Brooke, B.C.E., M.A., Professor of Mathematics and Mechanics
Oscar Burkhard, M.A., Assistant Professor of German
William H. Bussey, Ph.D., Assistant Professor of Mathematics
Peter Christianson, B.S., E.M., Professor of Assaying
Frederic Clements, Ph.D., Professor of Botany
Hans Dalaker, B.S., Assistant Professor of Mathematics
Ira H. Derby, B.A., Assistant Professor of Chemistry
John F. Downey, M.A., C.E., Professor of Mathematics
Henry T. Eddy, C.E., Ph.D., LL.D., Professor of Mathematics and Mechanics
Henry A. Erikson, E.E., Assistant Professor of Physics
John J. Flather, Ph.B., M.E., Professor of Mechanical Engineering
John H. Gray, Ph.D., Professor of Economics
Christopher W. Hall, M.A., Professor of Geology and Mineralogy
Arthur Edwin Haynes, M.S., M.Ph., Sc.D., Professor of Engineering Mathematics
Everhart P. Harding, M.S., Ph.D., Assistant Professor of Chemistry
Frederick S. Jones, M.A., Professor of Physics
Hans Juergensen, Assistant Professor of German
William H. Kavanaugh, M.E., Professor of Experimental Engineering
William Kirchner, B.S., Professor of Drawing and Descriptive Geometry
John V. Martenis, M.E., Assistant Professor of Machine Design
John G. Moore, B.A., Professor of German
Burt L. Newkirk, Ph.D., Assistant Professor of Mathematics and Mechanics
Edward E. Nicholson, M.A., Assistant Professor of Chemistry
Levi B. Pease, B.Sc.Chem., M.S., Professor of Metallurgy

Edward Van Dyke Robinson, Ph.D., Professor of Economics
Carl Otto Rosendahl, Ph.D., Assistant Professor of Botany
George D. Shepardson, M.A., M.E., Professor of Electrical Engineering
Charles F. Sidener, B.S., Professor of Chemistry
Edward Sigerfoos, Ph.B., Capt. U.S.A., Professor of Military Science
Frank W. Springer, E.E., Professor of Electrical Engineering
Josephine E. Tilden, M.S., Assistant Professor of Botany
Charles E. van Barneveld, B.A., Sc., E.M., Professor of Mining Engineering
Mathilda Wilkin, M.L., Assistant Professor of German
John Zeleny, B.S., Ph.D., Professor of Physics
Anthony Zeleny, M.S., Ph.D., Assistant Professor of Physics

INSTRUCTORS

Walter Badger, B.A., B.S. Chem., Instructor in Chemistry
Lilian Cohen, M.A., Instructor in Chemistry
Louis J. Cooke, M.D., Director of the Gymnasium
Oscar W. Firkins, M.A., Instructor in Rhetoric
Francis C. Frary, M.S., Instructor in Chemistry
Frank F. Grout, B.S., Instructor in Mineralogy
John A. Handy, Ph.C., Instructor in Chemistry
Alois F. Kovarik, B.A., Instructor in Physics
James E. Manchester, Sc.D., Instructor in Mathematics
Peter Peterson, Instructor in Foundry Practice
Raymond V. Phelan, Ph.D., Instructor in Economics
Edward Quigley, Instructor in Forge Work
William H. Richards, Instructor in Shop Work
William T. Ryan, E.E., Instructor in Electrical Engineering
S. Carl Shipley, B.S., Instructor in Machine Work
C. F. Shoop, B.S., Instructor in Mechanical Engineering
Richard Wischkaemper, Instructor in German
James Zimmerman, B.A., Instructor in Chemistry
William Methley, Lecture Assistant

ADMISSION

Examinations for admission will be held at the beginning of the year. See calendar and program of examinations.

No student will be registered for first semester's work after September 25th, 1909 or for second semester's work after February 12th, 1910.

All applicants should present themselves to the registrar who will furnish them with application blanks and directions covering examinations and registration.

GENERAL REGULATIONS GOVERNING ADMISSION

I. Students will be admitted to the freshman class on passing the regular entrance examinations.

II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special recommendation of the department of mathematics.

III. Graduates of any Minnesota State high school will be admitted to the course in Analytical Chemistry without entrance examinations provided:

(1) That the school maintain a full four-year course of high school work.

(2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.

Applicants for admission to the Applied course must conform to the mathematics requirements mentioned below, but as regards other subjects, will be admitted on the same terms as students in the Analytical course.

IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to that committee not later than Tuesday of examination week.

V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examinations in all subjects, as provided in sections I and II unless excused by vote of the faculty; and persons wishing to present reasons for such excuse should report to the enrollment committee not later than Tuesday of examination week.

VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.

VII. Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four-year course, exclusive of the common school branches, conforming essentially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and, after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided:

(1) That the school be open to inspection at any time by the University;

(2) That it take such supplementary examinations as may be prescribed from time to time.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing September 6th, in School of Chemistry Building, room 5, at 9 o'clock a. m.

ENTRANCE EXAMINATIONS IN MATHEMATICS

(APPLIED COURSE)

Every applicant for admission to the freshman class of the Applied Course, whether a graduate of a high school or not, must either

(a) present State High School Board certificates for each of the mathematical subjects required for admission, or

(b) take the entrance examinations in said subjects at the University.

No applicant will be admitted who fails to obtain credit in one of these two ways in all of the mathematical subjects required for admission.

Students proposing to enter this course should be thoroughly prepared in mathematics, since the prosecution of the work depends so largely upon the preliminary training in this subject.

REQUIREMENTS FOR ADMISSION

For list and description of subjects accepted for admission see pages 54, 55 and 58

ADVANCED STANDING

The University accepts records from all reputable colleges for credit toward advanced standing. Such records are accepted as far as they are equivalent to the work done in this University. In bringing records from other institutions the certificate must be upon the official blank of the institution granting the certificate, and should show:

1. The subjects studied; if a language, the work read, etc.
2. The time spent on each subject.
3. Ground covered in laboratory work in case of laboratory subjects.
4. The result. It is sufficient to state that the subject was creditably completed.

Records from institutions whose entrance requirements are not essentially equivalent to the requirements of the University, will not be accepted unquestioned; the credit to be allowed will be decided in individual cases by the enrollment committee.

ADVANCED CREDIT

(COURSE IN APPLIED CHEMISTRY)

Advanced credit for work done in manual training in the high schools is allowed under the following conditions:

(a) The courses in drawing and shop work in the high schools must be approved by the corresponding departments in the College of Engineering.

(b) Students presenting two or three year credits in wood-work from such courses will receive an advanced credit in the first semester freshman shop.

(c) Students presenting three year credits from such courses in drawing will receive an advanced credit of the second semester freshman drawing.

(d) Students presenting four year credits from such courses in shop will receive an advanced credit of the first semester freshman and one-half semester sophomore shop.

(e) Students presenting four year credits from such courses in drawing will receive an advanced credit of the first and second semester freshman drawing, not including descriptive geometry.

GENERAL STATEMENT

The School of Analytical and Applied Chemistry offers three courses. Two of these, the Analytical and the five year course in Arts and Chemistry are designed for those who wish to become teachers of chemistry, analysts and investigators. The four year Analytical course leads to the degree of B. S. in chemistry, while the five year course leads to the degree of B. A. after four years, and B.S. in chemistry at the end of the fifth.

The third or Applied course extends over five years, leading to the degree of B. S. at the end of four years and Chemical Engineer at the end of the fifth. These courses aim to give the student a broad foundation in chemistry and some of the allied sciences.

DAILY ROUTINE

The morning session begins at 8:30 o'clock; a general assembly of the faculty and students is held each day at 10:25 o'clock, at which there are brief and simple religious exercises. Work extends through six days of the week.

FEES

All students in the college, who are residents of the state, are charged an incidental fee of fifteen dollars a semester. Non-residents are charged double the fee required of residents of the state, or thirty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. Save in the case of the first registration, the incidental fee is increased 25 cents for each day's delay in registration, beginning with the day set for recitations to begin. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage.

EQUIPMENT

Buildings. The two buildings occupied by the School contain six large laboratories and about twenty smaller ones, well equipped for carrying on a wide range of work.

Library. The chemical library contains complete sets of many of the important journals. It contains besides these special sets, a well represented list of analytical and technical works, as well as many rare old works of great historical value. Most of the important journals are taken, thus enabling the student to keep abreast of the times. All books are easily accessible, with only the necessary restrictions to guard against injury and loss.

Industrial Museum. Considerable space is given to a collection in industrial, technical and applied chemistry. There is a large collection of chemicals, with specimens of each in the various stages of preparation and purification; a collection of nearly all the elements, with most of their important salts; a large number of mining and metallurgical specimens, including most of the important ores, together with many rare specimens in crystallography. The collections of coals and petroleums are especially valuable for lecture and technical work. There is a large collection of dyes, organic and inorganic, mordants, textiles, and other materials used in dyeing and bleaching, with a rapidly increasing collection of clays and materials used in making glass, earthenware, porcelain and brick. A collection of furnace products, models and series of charts, blue prints and photographs illustrating a wide range of technical and chemical processes is being added.

INDUSTRIAL PHOTOGRAPHY. The photographic laboratories are equipped with process lenses, copying cameras, printing frames, presses, etching tubs, etc., for the production of half tone, zinc etching and color work. Students who desire to become expert photo-engravers may specialize in this work during the senior year.

CHEMICAL SOCIETIES

AMERICAN CHEMICAL SOCIETY. A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

SCHOOL OF CHEMISTRY SOCIETY. The School of Chemistry Society is an organization of the students of the School, which meets once a month to consider topics of general interest. The Society also procures lecturers to address the school.

Courses of Study

ANALYTICAL CHEMISTRY

FRESHMAN YEAR

FIRST SEMESTER

CHEMISTRY 3, five hours, Assistant Professor Nicholson, Mr. Frary, and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Bauer, Assistant Professor Bussey
MINERALOGY 1, six hours, Professor Hall, Mr. Grout
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

SECOND SEMESTER

CHEMISTRY 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Bauer, Assistant Professor Bussey
*METALLURGY 1, twelve hours, Professor Appleby, Professor Christianson, Professor Pease
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour, (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

*Women must take Mineralogy 2 instead of Metallurgy 1

SOPHOMORE YEAR

FIRST SEMESTER

††BOTANY 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
CHEMISTRY 4, eleven hours, Professor Sidener and Assistants
ECONOMICS 1, three hours Professor Robinson, Mr. Phelan
GERMAN 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen, Burkhard and Mr. Wischkaemper
CHEMISTRY 8, six hours, Assistant Professor Harding
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.

SECOND SEMESTER

††BOTANY 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
CHEMISTRY 4, four hours, Professor Sidener and Assistants
CHEMISTRY 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
POLITICAL SCIENCE 1, three hours, Professor Schaper, Mr. Allin
GERMAN 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
MILITARY DRILL, three hours, Captain Sigerfoos, U.S.A.

JUNIOR YEAR

FIRST SEMESTER

†CHEMISTRY 9, five hours, Assistant Professor Nicholson
CHEMISTRY 10, six hours, Professor Sidener
GEOLOGY 1, three hours, Professor Hall
*METALLURGY 3, three hours, Professor Christianson
MINERALOGY 5, six hours, Mr. Grout
PHYSICS 1, three hours, Professor John Zeleny
PHYSICS 2, two hours, Mr. Kovarik

SECOND SEMESTER

†CHEMISTRY 7, two hours, Miss Cohen
CHEMISTRY 6, two hours, Assistant Professor Derby
CHEMISTRY 13, two hours, Mr. Frary
CHEMISTRY 11, six hours, Professor Sidener and Assistants

CHEMISTRY 12, four hours, Professor Sidener and Assistants
*METALLURGY 4, three hours, Professor Christianson
PHYSICS 3, three hours, Professor John Zeleny
PHRSICS 4, two hours, Mr. Kovarik

SENIOR YEAR

FIRST SEMESTER

CHEMISTRY 16, four hours, Mr. Frary
CHEMISTRY 18, seven hours, Assistant Professor Derby
CHEMISTRY 19, five hours, Assistant Professor Harding
†CHEMISTRY 15, six hours, Assistant Professor Harding
CHEMISTRY 14, four hours, Professor Frankforter
*METALLURGY 5, four hours, Professor Pease
THESIS

SECOND SEMESTER

CHEMISTRY 20, two hours, Professor Frankforter
CHEMISTRY 21, five hours, Mr. Frary
CHEMISTRY 22, five hours, Mr. Frary
CHEMISTRY 23, four hours, Assistant Professor Harding
†CHEMISTRY 15, six hours, Assistant Professor Harding
*METALLURGY 6, four hours, Professor Pease
THESIS

*This course is not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee.

†Students wishing to specialize in the chemistry of iron and steel or in photo-engraving may elect special subjects along these lines in place of subjects marked thus above.

††Students may substitute Animal Biology 1 for Botany

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

The degree bachelor of arts will be conferred upon any student who completes the work prescribed in the first four years of the following course, provided that at least one long course shall be chosen from each of the following groups.

(a) English, French, German, Greek, Latin, Rhetoric.
(b) Animal Biology, Astronomy, Botany, Chemistry, Mineralogy, Physics.
(c) History, Philosophy, Political Science and Sociology

A long course means an amount of work equivalent to not less than six hours per week in one department for one year.

The degree of bachelor of science in chemistry will be conferred upon the completion of the fifth year of the course.

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

FIRST YEAR

FIRST SEMESTER

CHEMISTRY 3, five hours, Assistant Professor Nicholson, Mr. Frary and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Bauer, Assistant Professor Bussey
MINERALOGY 1, six hours, Professor Hall, Mr. Grout
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour, (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

SECOND SEMESTER

*METALLURGY 1, twelve hours, Professor Appleby, Professor Christianson, Professor Pease
CHEMISTRY 3, five hours, Assistant Professor Nicholson, Mr. Frary and Assistants
DRAWING 7, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
MATHEMATICS 3a, five hours, Professor Baüer, Assistant Professor Bussey
RHETORIC 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.
PHYSICAL CULTURE, one hour, (for men), Dr. Cooke, or
PHYSICAL CULTURE, three hours, (for women), Miss Butner

SECOND YEAR

FIRST SEMESTER

†BOTANY 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors

*Women must take Mineralogy 2, instead of Metallurgy 1.

CHEMISTRY 4, eleven hours, Professor Sidener and Assistants
ECONOMICS 1, three hours, Professor Robinson, Mr. Phelan
GERMAN 1 or 4, five or three hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
CHEMISTRY 8, six hours, Assistant Professor Harding
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.

SECOND SEMESTER

†Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors
CHEMISTRY 4, four hours, Professor Sidener and Assistants
CHEMISTRY 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
POLITICAL SCIENCE 1, three hours, Professor Schaper, Mr. Allin
GERMAN 1 or 4, five or three hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
MILITARY DRILL, three hours, Captain Edward Sigerfoos, U.S.A.

THIRD YEAR

FIRST SEMESTER

*GERMAN 4, three hours, Professor Moore
PHYSICS 1, three hours, Professor John Zeleny
PHYSICS 2, two hours, Mr. Kovarik
ELECTIVES in College of Science, Literature and the Arts, eight or nine hours.

SECOND SEMESTER

CHEMISTRY 13, two hours, Mr. Frary
*GERMAN 4, three hours, Professor Moore
PHYSICS 3, three hours, Professor John Zeleny
PHYSICS 4, two hours, Mr. Kovarik
ELECTIVES IN COLLEGE OF SCIENCE, LITERATURE AND THE ARTS eight hours.

†Or Animal Biology 1.

*Those who have taken German 4, may take French, Spanish or German 7.

FOURTH YEAR

First Semester

Chemistry 9, five hours, Assistant Professor Nicholson
Chemistry 19, five hours, Assistant Professor Harding
Chemistry 10, six hours, Professor Sidener
Geology 1, three hours, Professor Hall
*Metallurgy 3, three hours, Professor Christianson
Mineralogy 5, three hours, Mr. Grout

Second Semester

Chemistry 7, two hours, Miss Cohen
Chemistry 6, two hours, Assistant Professor Derby
Economics (elective), three hours, Professor Gray
Chemistry 11, six hours, Professor Sidener and Assistants
Chemistry 12, four hours, Professor Sidener and Assistants
*Metallurgy 4, three hours, Professor Christianson

FIFTH YEAR

First Semester

Chemistry 16, four hours, Mr. Frary
Chemistry 18, seven hours, Assistant Professor Derby
Chemistry 15, six hours, Assistant Professor Harding
*Metallurgy 5, four hours, Professor Pease
Chemistry 14, four hours, Professor Frankforter
Thesis

SECOND SEMESTER

Chemistry 20, two hours, Professor Frankforter
Chemistry 21, five hours, Mr. Frary
Chemistry 22, five hours, Mr. Frary
Chemistry 15, six hours, Assistant Professor Harding
*Metallurgy 6, four hours, Professor Pease
Chemistry 23, four hours, Assistant Professor Harding
Thesis

*This course is not open to women. An elective may be taken in any science, with the approval of the Students' Work Committee [illegible] Professors

[illegible] Professor

[illegible] Professors

[illegible] Literature and the Arts eight

[illegible] may take French

FOURTH YEAR

FIRST SEMESTER

CHEMISTRY 9, five hours, Assistant Professor Nicholson
CHEMISTRY 19, five hours, Assistant Professor Harding
CHEMISTRY 10, six hours, Professor Sidener
GEOLOGY 1, three hours, Professor Hall
***METALLURGY** 3, three hours, Professor Christianson
MINERALOGY 5, three hours, Mr. Grout

SECOND SEMESTER

CHEMISTRY 7, two hours, Miss Cohen
CHEMISTRY 6, two hours, Assistant Professor Derby
ECONOMICS (elective), three hours, Professor Gray
CHEMISTRY 11, six hours, Professor Sidener and Assistants
CHEMISTRY 12, four hours, Professor Sidener and Assistants
***METALLURGY** 4, three hours, Professor Christianson

FIFTH YEAR

FIRST SEMESTER

CHEMISTRY 16, four hours, Mr. Frary
CHEMISTRY 18, seven hours, Assistant Professor Derby
CHEMISTRY 15, six hours, Assistant Professor Harding
***METALLURGY** 5, four hours, Professor Pease
CHEMISTRY 14, four hours, Professor Frankforter
THESIS

SECOND SEMESTER

istry 20, two hours, Professor Frankforter
ry 21, five hours, Mr. Frary
y 22, five hours, Mr. Frary
y 15, six hours, Assistant Professor Harding
gy 6, four hours, Professor Pease
y 23, [illegible] urs, Assistant Professor Harding

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vit [illegible] al [illegible]

h, Mr.
Assistant

Gas Engineer-
ace of subjects

APPLIED CHEMISTRY
(Chemical Engineering.)

FRESHMAN YEAR

Chemistry 3, five hours, Assistant Professor Nicholson, Mr. F. C. Frary
Drawing 1 and 3, seven hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Mathematics 1 and 2, five hours, Professor Haynes, Assistant Professor Newkirk, Mr. H. D. Frary
Mechanical Engineering 1 and 2, six hours, Mr. Richards, Mr. Shipley, Mr. Quigley
Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Griffith, Miss Whitney
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 4, eleven hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rowley, Mr. Rose
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
Mathematics 3, four hours, Professor Haynes, Professor Brooke
Physics 5, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SECOND SEMESTER

Chemistry 4, four hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rowley, Mr. Rose
German 1 or 4, three or five hours, Professor Moore, Assistant Professors Juergensen and Burkhard, Mr. Wischkaemper
Mathematics 4, four hours, Professor Haynes, Professor Brooke
Mechanical Engineering 4, six hours, Mr. Shipley
Physics 6, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

FIRST SEMESTER

Chemistry 14, four hours, Professor Frankforter
Economics 1, three hours, Professor Robinson, Mr. Phelan

Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis
Mineralogy 1, six hours, Professor Hall and Mr. Grout
Physics 7, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SECOND SEMESTER

Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
Mathematics 6, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 12, six hours, Assistant Professor Martenis
Physics 8, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SENIOR YEAR

FIRST SEMESTER

Chemistry 19, five hours, Assistant Professor Harding
Electrical Engineering 5, four hours, Mr. Ryan
Experimental Engineering 1, four hours, Professor Kavanaugh, Mr. Shoop
Mathematics 7, four hours, Professor Eddy, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 13, ten hours, Professor Flather, Assistant Professor Martenis
Metallurgy 3, three hours, Professor Christianson

SECOND SEMESTER

Chemistry 11, six hours, Professor Sidener and Assistans
†Elective, two or three credits
Electrical Engineering 5, four hours, Mr. Ryan
†Experimental Engineering 2, four hours, Professor Kavanaugh, Mr. Shoop
Mechanical Engineering 14a, four hours, Professor Flather, Assistant Professor Martenis
Mechanical Engineering 20, three hours, Professor Flather
Metallurgy 4, three hours, Professor Christianson

†Students wishing to specialize in Electrochemistry, Gas Engineering or Sugar Technology, may elect special subjects in place of subjects marked thus.

POST SENIOR YEAR

FIRST SEMESTER

Chemistry 9, five hours, Assistant Professor Nicholson
Chemistry 16, four hours, Mr. Frary
Chemistry 18, seven hours, Assistant Professor Derby
†Elective, two or three credits
Mechanical Engineering 19, one hour, Mr. Shoop
Political Science 16, two hours, Professor Schaper, Mr. Allin
Thesis, six hours

SECOND SEMESTER

†Chemistry 15, six hours, Assistant Professor Harding
Chemistry 17, four hours, Mr. Frary
Chemistry 22, five hours, Mr. Frary
†Elective, two or three credits
Political Science, 6, two hours. Mr. Allin
Thesis, six hours

APPLIED CHEMISTRY

Order of Studies for Classes Graduating 1910–1911–1912

SOPHOMORE YEAR

(Class of '12 only)

FIRST SEMESTER

Chemistry 4, eleven hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rose, Mr. Rowley
Economics 1, three hours, Professor Robinson, Mr. Phelan
Mathematics 3a, five hours, Professor Brooke
Physics 5, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SECOND SEMESTER

Chemistry 4, four hours, Professor Sidener and Assistants
Drawing 5, six hours, Professor Kirchner

†Students wishing to specialize in Electrochemistry, Gas Engineering or Sugar Technology, may elect special subjects in place of subjects marked thus.

Political Science 1, three hours, Professor Schaper, Mr. Allin
Mathematics 4, five hours, Professor Brooke
Physics 6, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

(Classes '11 and '12)

FIRST SEMESTER

Chemistry 14, four hours, Professor Frankforter
Electrical Engineering 5, four hours, Mr. Ryan
Experimental Engineering 1, four hours, Professor Kavanaugh, Mr. Shoop
Metallurgy 3, three hours, Professor Christianson

Also Class of '11 will take

Chemistry 10, six hours, Professor Sidener
Mathematics 7, three hours, Professor Downey
Physics 7; five hours, Assistant Professor A. Zeleny

But Class of '12 will take instead

Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis
Physics 7, five hours, Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik

SECOND SEMESTER

Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby, Mr. Handy and Assistants
Electrical Engineering 5, four hours, Mr. Ryan
Metallurgy 4, three hours, Professor Christianson

Also Class of '11 will take

Chemistry 11, six hours, Professor Sidener and Assistants

But Class of '12 will take instead

Mathematics 6, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk

SENIOR YEAR

(Classes of '10, '11, '12)

FIRST SEMESTER

Chemistry 16, four hours, Mr. Frary
Chemistry 19, five hours, Assistant Professor Harding
Thesis, six hours

Also Class of '10 will take

Chemistry 14, four hours, Professor Frankforter
Mathematics 7a′, five hours, Professor Eddy
Metallurgy 3, three hours, Professor Christianson

But Class of '11 will take, instead

Chemistry 9, five hours, Assistant Professor Nicholson
Mathematics 5, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Mechanical Engineering 11, three hours, Assistant Professor Martenis

But Class of '12 will take, instead

Chemistry 10, six hours, Professor Sidener
Chemistry 9, five hours, Assistant Professor Nicholson
Mathematics 7, four hours, Professor Eddy, Assistant Professor Brooke, Assistant Professor Newkirk

SECOND SEMESTER

Chemistry 17, four hours, Mr. Frary
Thesis, six hours

Also Class of '10 will take

Chemistry 11, six hours, Professor Sidener, and Assistants
Mathematics 8′, five hours, Professor Eddy, Professor Brooke, Assistant Professor Newkirk
Metallurgy 4, three hours, Professor Christianson

But Class of '11 will take, instead

Chemistry 19, five hours, Assistant Professor Harding
Chemistry 22, five hours, Mr. Frary
Mathematics 6′, three hours, Professor Haynes, Professor Brooke, Assistant Professor Newkirk
Elective, two or three credits

But Class of '12 will take, instead

Chemistry 11, six hours, Professor Sidener and Assistants
Chemistry 22, five hours, Mr. Frary
Elective, two or three credits

ANIMAL BIOLOGY

Charles P. Sigerfoos, Ph.D., Professor of Zoology
John C. Brown, M.A., Assistant Professor of Animal Biology
Hal Downey, M.A., Assistant Professor of Animal Biology
Oscar W. Oestlund, M.A., Ph.D., Assistant Professor of Animal Biology
Charles E. Johnson, B.A., Assistant in Animal Biology

1. General Zoology — Professor Sigerfoos, Assistant Professors Oestlund, Brown, Downey, and Mr. Johnson

Six credits (six hours per week) — Both semesters

Open to all; the laboratory fee is three dollars per semester.

This course is a comparative study of the principles of structure, physiology and development in the animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of the cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's Manual of Zoology.

2. Morfology of Invertebrates — Professor Sigerfoos and Mr. Johnson

Six credits (six hours per week) — Both semesters

Open to those who have completed course one; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The object of this course is to familiarize the student with the methods and principles of zoology thru an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course one.

For other courses open as electives, see the bulletin of the College of Science, Literature and the Arts.

BOTANY

Frederic Clements, Ph.D., Professor of Botany
Carl Otto Rosendahl Ph.D., Assistant Professor of Botany
Josephine E. Tilden, M.S., Assistant Professor of Botany
Frederick K. Butters, M.S., Instructor in Botany
Ned L. Huff, M.A., Instructor in Botany

1. General Botany — Professor Clements, Assistant Professors Tilden and Rosendahl, Mr. Huff, Mr. Butters

Six credits (three hours laboratory, three lectures per week)
First and second semesters

Open to all.

Both semesters must be completed before credit is given for the first semester.

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

2. ADVANCED BOTANY PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL

Six credits (three hours laboratory, three lectures per week) First and second semesters

Open to students who have completed course one.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissues and of reproduction; and the general relations of the plant to the physical factors of its home Lectures and quizzes, laboratory, greenhouse and field work.

13. INDUSTRIAL BOTANY ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week) Both semesters.

Open to technical students who have completed course 1.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

15. BOTANICAL MICROCHEMISTRY PROFESSOR CLEMENTS

Three credits (six hours per week) Both semesters

Open to those who have completed course 1.

This course is designed especially for students in the School of Chemistry. It comprises a microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., Dean and Professor of Chemistry
CHARLES F. SIDENER, B.S., Professor of Chemistry
IRA H. DERBY, B.A., Assistant Professor of Chemistry
EVERHART P. HARDING, M.S., Ph.D., Assistant Professor of Chemistry
EDWARD E. NICHOLSON, M.A., Assistant Professor of Chemistry
WALTER BADGER, B.A., Instructor in Chemistry
LILIAN COHEN, M.A., Instructor in Chemistry
FRANCIS C. FRARY, M.S., Instructor in Chemistry
JOHN A. HANDY, Ph.C., Instructor in Chemistry
JAMES ZIMMERMAN, B.A., Instructor in Chemistry

FOR UNDERGRADUATES

1. GENERAL CHEMISTRY MISS COHEN, MR. BADGER AND ASSISTANTS

Six credits (two lectures, four hours laboratory per week) First and second semesters

No prerequisite.

The course includes a study of the chemical properties of the metallic and non-metallic elements, with a brief introduction to organic chemistry.

2. ADVANCED GENERAL CHEMISTRY — PROFESSOR FRANKFORTER, MISS COHEN, MR. BADGER AND ASSISTANTS

Six credits (two lectures, four hours laboratory per week)
First and second semesters

Prerequisite,—Entrance credit in chemistry

The course includes besides descriptive and metallurgical chemistry, an introduction to physical and organic chemistry.

3. QUALITATIVE ANALYSIS — ASSISTANT PROFESSOR NICHOLSON, MR. FRARY AND ASSISTANTS

Six credits (one lecture, 4 hours laboratory per week)
First and second semesters

Prerequisite,—Course 1 or 2.

The course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. QUANTITATIVE ANALYSIS — PROFESSOR SIDENER AND ASSISTANTS

Six credits (one lecture, ten hours laboratory per week) First semester
Two credits (one lecture, two hours laboratory per week) Second semester

Prerequisite,—Course 3.

The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester, followed by a discussion of standard solutions and the necessary stoechiometric calculations with laboratory work in volumetric analysis, second semester.

5. ORGANIC CHEMISTRY — PROFESSOR FRANKFORTER, ASSISTANT PROFESSOR DERBY, MR. HANDY AND ASSISTANTS

Nine credits (three lectures, twelve hours laboratory per week) Second semester

Prerequisite,—Course 3.

This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.

6. THEORETICAL CHEMISTRY — ASSISTANT PROFESSOR DERBY

Two credits (one lecture and one recitation per week) Second semester

Prerequisite,—Course 5.

The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.

7. HISTORY OF CHEMISTRY — MISS COHEN

Two credits (one lecture and one recitation per week) Second semester

Prerequisite,—Course 5.

This course includes a full historical discussion of alchemy and chemistry

8. INORGANIC PREPARATIONS — ASSISTANT PROFESSOR HARDING

Three credits (six hours laboratory) First semester

Prerequisite,—Course 3

The preparation of inorganic salts, supplemented by Thorpe's Inorganic Preparations.

9. SUGAR CHEMISTRY — ASSISTANT PROFESSOR NICHOLSON

Three credits (one lecture, four hours laboratory per week) First semester

Prerequisite,—Course 5

The course includes the technology and chemical control of sugar manufacture.

10. Special Problems — Professor Sidener
Three credits (six hours laboratory per week) — First semester
Prerequisite,—Course 4

The course includes the working out of various mineralogical, technological and metallurgical problems.

11. Iron and Steel Analysis — Professor Sidener and Assistants
Three credits (six hours laboratory per week) — Second semester
Prerequisite,—Course 4

The course includes the rapid determination of iron by the various methods as well as the determination of the associated elements, sulphur, phosphorus, silicon manganese and carbon.

12. Mineral Analysis — Professor Sidener
Two credits (four hours laboratory per week) — Second semester
Prerequisite,—Course 4

The course includes the analysis of building stones and some of the most important minerals.

13. Glass Blowing — Mr. Frary
One credit (two hours laboratory per week) — Second semester

The course includes the methods used in the construction and repair of simple glass apparatus.

14. Water Analysis — Professor Frankforter
Two credits (four hours laboratory per week) — First semester
Prerequisite,—Course 4

The course includes an exhaustive discussion of the chemical and sanitary properties of water.

15. Food Analysis — Assistant Professor Harding
Three credits (six hours laboratory per week) — First and second semester
Prerequisite,—Course 5

The course includes the chemical analysis of the various food products and the detection of the common adulterants.

16. Industrial Chemistry — Mr. Frary
Three credits (two lectures, two hours laboratory per week) — First semester
Prerequisite,—Course 5

The course includes the discussion of methods and apparatus used in chemical technology, and the testing of commercial chemical products.

17. Industrial Chemistry — Mr. Frary
Continuation of course 16 — Second semester

18. Physical Chemistry — Assistant Professor Derby
Four credits (one lecture, six hours laboratory per week) — First semester
Prerequisite,—Chemistry 5, Physics 3 and 4.

The course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

19. Gas and Coal Analysis — Assistant Professor Harding
Three credits (one lecture, four hours laboratory per week) — First semester
Prerequisite,—Course 4

The course comprises the method of collecting and storing gases previous to their analysis; the methods of manufacturing commercial gases; their chemical analysis, calorific and photometric determination; also the ultimate and proximate analysis of coals and their calorific determination.

20. COLLOQUIUM — PROFESSOR FRANKFORTER
Two credits (two hours per week) — Second semester
Prerequisite,—Course 5

A thorough quiz in general organic and inorganic chemistry.

21. PHOTOCHEMISTRY — MR. FRARY
Three credits (one lecture, four hours laboratory per week) — Second semester
Prerequisite,—Course 5

The course includes a study of the compounds affected by the chemical rays of light, and a discussion of developers and fixers, photo-engraving, photo-reliefs and color-photography.

22. ELECTROCHEMISTRY — MR. FRARY
Three credits (one lecture, four hours laboratory per week) — Second semester
Prerequisite,—Course 4 and also course 3 in physics.

The course includes a discussion of electro-analytical methods and industrial electrochemical processes.

23. MICROCHEMISTRY — ASSISTANT PROFESSOR HARDING
Two credits (four hours laboratory per week) — Second semester
Prerequisite,—Course 4

This course includes the methods for the identification of minute quantities of substances by means of the microscope.

24. RADIOCHEMISTRY — ASSISTANT PROFESSOR DERBY
Three credits — Second semester

This course has to do with the phenomena associated with the various radioactive elements including the chemical changes which these elements undergo and the chemical reactions which may be induced while the changes are in progress.

25. TEACHERS' COURSE — MISS COHEN
Two credits (two hours per week) — Second semester
Prerequisite,—Course 3

The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

26. HOUSEHOLD AND SANITARY SCIENCE
Elective for women.
Prerequisite,—Course 3.

Offered by the Departments of Bacteriology, Botany, Animal Biology, Chemistry, Hygiene, Economics, Sociology and Mechanical and Municipal Engineering.

The course includes, for the most part, a discussion of foods and foodstuffs from the botanical, biological, chemical and physiological points of view; also a discussion of sanitary engineering, hygiene, heating, lighting and ventilation.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, M.E., Professor of Drawing and Descriptive Geometry
NORMAN W. ROSE, M.E., Instructor in Drawing
FRANK B. ROWLEY, B.S., M.E., Instructor in Drawing

1. **DRAWING** — MR. ROSE, MR. ROWLEY
Three credits (six hours per week) — First semester
The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.
Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working-drawings.

2. **DRAWING** — MR. ROSE, MR. ROWLEY
Two credits (four hours per week) — Second semester
Preparation courses 1 and 3 D.
Continuation of course 1.

3. **DESCRIPTIVE GEOMETRY** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
One credit (one hour per week) — First semester
Open to students pursuing course 1 D.
Projection-central and special cases; principles and applications. Representation of lines, planes, and solids, and of their relations; tangencies, intersections and developments.
Recitations, lectures and the solution of problems.

4. **DESCRIPTIVE GEOMETRY** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Two credits (two hours per week) — Second semester
Preparation, course 1, 3 D.
Continuation of course 3.

5. **DRAFTING** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (six hours per week) — First and second semester
Preparation courses 1, 2, 3, 4 D.
Graphics, machine drafting, structural drafting, and topography. Instruction in drafting room methods.

6. **ELEMENTS OF ARCHITECTURE** — PROFESSOR KIRCHNER
Three credits — First semester
Preparation course, 5 D.
The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.

7. **TECHNICAL DRAWING** — PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (six hours per week) — First and second semesters
Required of freshmen, analytical chemistry course.
Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings and translations.

FOR GRADUATES

8. **DESCRIPTIVE GEOMETRY AND APPLICATIONS**

9. **PROJECTIVE GEOMETRY**

ECONOMICS AND POLITICAL SCIENCE

ECONOMICS

JOHN H. GRAY, Ph.D., Professor of Economics
EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
RAYMOND V. PHELAN, Ph.D., Instructor in Economics

1. Elements of Economics — Professor Robinson, Mr. Phelan

Three credits (three recitations per week) — First and second semester

A thorough course in the elements of economic theory, with special reference to present-day economic and social problems.

McVey's Outline and a text book, supplemented by lectures and problems, with a weekly quiz. This is a beginning course designed for those desiring a general knowledge of economics, as well as for those who mean to take advanced work in the department.

2a. Economic Geography — Professor Robinson

Three credits (three hours per week) — First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces: (1) a brief survey of the history of commerce prior to the modern period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and, (5) a more detailed consideration of the natural resources, chief indnstries, commarcial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text-book, supplementd by lectures, reeports on special topics, and quiz.

22. Materials of Commerce — Mr. Coulter

Three credits (three hours per week) — First semester

Prerequisite,—Course 2a.

A study of the principal wares of commerce with reference to their sources uses and industrial processes.

Text with collateral reading, lectures and visits of inspection.

5a. Money and Banking — Mr. Phelan

Three credits (three hours per week) — Repeated each semester

Prerequisite, course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

11. The Modern Business Corporation — Professor Gray

Three credits (three recitations per week) — Second semester

Prerequisite course 1.

The organizing, financing and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases.

Text-books: Ripley, Trusts, Pools and Corporations; Meade's Trust Finance; Wyman's Case.

Lectures, class discussions and reports.

20a. The Principles of Accounting

Three credits (three recitations per week) — First and second semester

Prerequisite,—Course 1.

The theory and practice of accounting, with a view to general business efficiency Methods employed in manufacturing, mercantile, banking and railway accounting Analysis of industrial, bank and railway reports.

Lectures and exercises.

21. **ELEMENTS OF BUSINESS LAW**

Three credits (three recitations per week) First or second semester

Prerequisite,—Course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in every-day business affairs.

Assigned readings, lectures and quizzes.

19. **BUSINESS ORGANIZATION**

Three credits (three recitations per week) Second semester

Prerequisite,—Course 1.

A study of the internal organization and management of large scale industry, covering typical manufacturing and mercantile concerns.

Based on Sparling, Introduction to Business Organization, with lectures, assigned readings and discussions.

For other courses in Economics open as electives see Bulletin of the College of Science, Literature and the Arts.

POLITICAL SCIENCE

WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
CEPHAS D. ALLIN, M.A., L.L.B., Instructor in Political Science

1. **AMERICAN GOVERNMENT** PROFESSOR SCHAPER AND MR. ALLIN

Three credits (three hours per week) Repeated each semester

An elementary course in American government intended as a preparation for the advanced courses in political science, for teaching in secondary schools, and for good citizenship; a study of the organization and actual workings of the national and local governments; a series of lectures on the nature and origin of the American governmental system precedes a study of the text and assigned topics; special attention will be given to important statutes on naturalization, organization of the judiciary, and of executive departments, interstate commerce, trusts, etc. Text, lectures, and special topics.

16. **AMERICAN GOVERNMENT** PROFESSOR SCHAPER, MR. ALLIN

Two credits, (two hours per week) First semester

An introductory course in political science. It includes a study of the organization and present workings of our national, state and local government, and serves as an introduction to course 6.

6. **ENGINEERING LAW** MR. ALLIN

Two credits (two hours per week) Second semester

Preparation, course 16.

A course in the elements of law especially designed for engineering students. It includes a study of the system of federal and state courts, the jury system, the law of contracts, corporations, partnerships and limited partnerships, administrative law, the rights and duties of citizenship and some leading features of the law of real and personal property and the law of riparian rights.

ELECTRICAL ENGINEERING

William T. Ryan, E.E., Instructor in Electrical Engineering

5. **Electric Power** — **Mr. Ryan**

Three credits (four hours per week) — First and second semesters

Prerequisite,—Courses 5, 6, Physics.

An elementary study of the electrical problems involved in the generation, distribution, measurement and utilization of power. Lectures, recitations and laboratory work supplemented by numerous practical problems. Textbook: Franklin and Esty, Elements of Electrical Engineering Practice.

EXPERIMENTAL ENGINEERING

William H. Kavanaugh, M.E., Professor of Experimental Engineering
C. F. **Shoop**, B.S., Instructor in Mechanical Engineering

1. **Materials Testing Laboratory** — **Professor Kavanaugh, Mr. Shoop**

Two credits (lecture and laboratory) — First semester

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

2 **Steam Laboratory** — **Professor Kavanaugh, Mr. Shoop**

Two credits (lecture and laboratory) — Second semester

Open to those pursuing course M. E. 20.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

GEOLOGY AND MINERALOGY

Christopher W. Hall, M.A., Professor of Geology and Mineralogy
Frank F. Grout, B.S., Instructor in Geology and Mineralogy

GEOLOGY

1. **General Geology** — **Professor Hall**

Three credits (three hours laboratory, three lectures per week) First semester

Comprises: (1) Geodynamics, in which are set forth phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Lectures and conferences illustrated by photographs, maps, profiles, and lantern slides.

12. **Applied Geology** — **Mr. Grout**

Three credits (three hours laboratory, three lectures per week)
First semester

Prerequisite,—Course 1.

An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic value including coal, mineral oil and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief summary of the nature and distribution of ore deposits. Text-book and reference reading.

MINERALOGY

1. ELEMENTS OF MINERALOGY — PROFESSOR HALL, MR. GROUT

Three credits (three hours laboratory, three lectures per week)

First semester

Open to all students.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and economic minerals; the basis of classifications.

(b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

2. DESCRIPTIVE MINERALOGY — PROFESSOR HALL, MR. GROUT

Three credits (three hours laboratory, three lectures per week)

Second semester

Open to all students.

(a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal axes. Thesis.

(b) Laboratory work; includes quantitative blowpipe analysis, crystal measurement, the sight determination of minerals, and reference reading.

4. OPTICAL MINERALOGY — MR. GROUT

Three credits (three hours laboratory, three lectures per week)

Second semester

Open to juniors or seniors

A study of the microscopic structure of crystals and crystal grains.

An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

5. THE MORPHOLOGY OF MINERALS — MR. GROUT

Three credits (three hours laboratory, three lectures per week)

First semester

Open to juniors or seniors.

A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.

GERMAN LANGUAGE AND LITERATURE

JOHN G. MOORE, B.A., Professor of German
OSCAR BURKHARD, M.A., Assistant Professor of German
HANS JUERGENSEN, Assistant Professor of German
RICHARD WISCHKAEMPER, Instructor in German

1. BEGINNING — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD AND MR. WISCHKAEMPER

Ten credits (five hours per week) First and second semesters

Open to all who do not present German for entrance.

Pronunciation, grammar, conversation and composition; selected reading in easy prose and verse.

To follow this course, students may take course 2 or course 3, and course 5 as a supplementary course to either.

3. SCIENTIFIC INTERMEDIATE — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD

Six credits (three hours per week) First and second semesters

Open to students who have completed course 1.

First semester—Hodge's German Science Reader (or equivalent). Second semester—Brandt and Day's German Scientific Reading. This course aims to give the student a reading knowledge of German for use in scientific studies.

This course may be supplemented by course 5. To follow this course students may elect course 7 or course 6, but must not elect course 4.

4. CLASSIC PROSE AND POETRY — PROFESSOR MOORE, ASSISTANT PROFESSOR BURKHARD AND MR. WISCHKAEMPER

Six credits (three hours per week) First and second semesters

Open to students who have presented German for entrance.

Not open to students who have credit for course 2 or course 3.

First semester—Meissner's Aus deutschen Landen; Goethe's Gedichte. Second semester—Schrakamp's Beruhmte Deutsche, Heine's Buch der Lieder. Review of German grammar throughout the year. This course may be supplemented by course 5

7. ADVANCED SCIENTIFIC READING — ASSISTANT PROFESSORS JUERGENSEN AND BURKHARD

Six credits (three hours per week) First and second semesters

Open to students who have taken course 3 or course 4.

Reading of monographs and periodicals.

MATHEMATICS

(College of Science, Literature and Arts, for students in analytical course and class of 1911 in applied course.)

JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
GEORGE N. BAUER, Ph.D., Professor of Mathematics
WILLIAM H. BUSSEY, Ph.D., Assistant Professor of Mathematics
HANS DALAKER, B.S., Instructor in Mathematics
JAMES E. MANCHESTER, Sc.D., Instructor in Mathematics
ROYAL R. SHUMWAY, B.A., Instructor in Mathematics

3a. HIGHER ALGEBRA FOR CHEMISTS — PROFESSOR BAUER

Five credits (five hours per week) First and second semesters

7. INTEGRAL CALCULUS — PROFESSOR DOWNEY

Three credits (three hours per week) First semeste

Open to those who have completed courses 3 to 6 inclusive.

Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volume.

MATHEMATICS AND MECHANICS

(For students in the course in Applied Chemistry)

Henry T. Eddy, C.E., Ph.D., LL.D., Professor of Mathematics and Mechanics

William E. Brooke, B.C.E., M.A., Professor of Mathematics and Mechanics

Arthur Edwin Haynes, M.S., M.Ph., Sc.D., Professor of Engineering Mathematics

Burt L. Newkirk, Ph.D., Assistant Professor of Mathematics and Mechanics

Hobart D. Frary, M.S., Instructor in Mathematics

The ability to understand and apply mathematical processes readily is regarded as an essential to the engineer. The aim of these courses is to cultivate this ability so far as possible. To this end special emphasis is laid upon two things: elucidation of principles and drill upon their applications, as furnishing the only sure basis for a thorough technical and professional training. Courses 1 to 8 inclusive must be taken up in the order indicated, and in order to enter upon the work of any year the student must have attained a passing mark on all the required courses in preceding years.

1. HIGHER ALGEBRA AND ANALYTICAL TRIGONOMETRY PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

Five credits (five hours per week) First semester

Required of all freshmen. Theory of exponents, series, undetermined coefficients, determinants, theory of equations, graphs, logarithms, trigonometric transformations.

2. PLANE AND SPHERICAL TRIGONOMETRY AND ANALYTICAL GEOMETRY TO CONIC SECTIONS. PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. FRARY

Five credits (five hours per week) Second semester

Required of all freshmen. Properties of plane triangles and their solution by logarithmic tables and the slide rule; general properties and solution of spherical triangles; introduction to analytical geometry, transformation of co-ordinates, the right line and circle.

3. ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS PROFESSOR HAYNES, PROFESSOR BROOKE

Four credits (four hours per week) First semester

Required of all sophomores. Conic sections and other loci; the point, line, plane and quadric.

4. Differential and Integral Calculus — Professor Haynes, Professor Brooke

Four credits (four hours per week) — Second semester

Required of all sophomores. Differentiation and integration, expansion in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing.

5. Calculus and Mechanics — Professor Haynes, Professor Brooke, Assistant Professor Newkirk

Three credits (three hours per week) — First semester

Required of all juniors. Integration; rectification, quadrature, cubature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.

6. Analytical Mechanics — Professor Haynes, Professor Brooke, Assistant Professor Newkirk

Three credits (three hours per week) — Second semester

Required of all juniors. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics, courses 1 to 5 inclusive. Statics and dynamics, rectilinear, circular and harmonic motion, and curvilinear motion in general, dynamics of rigid bodies, impact, work and energy.

7. Strength and Resistance of Materials — Professor Eddy, Professor Brooke, Assistant Professor Newkirk

Prerequisite,—Course 6.

Four credits (four times per week) — First semester

Required of all seniors. Mechanical and elastic properties of materials of construction; beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, plates; theory of internal stress.

8. Hydraulics and Pumping Machinery — Professor Eddy, Professor Brooke, Assistant Professor Newkirk

Prerequisite,—Course 6.

Four credits (four times per week) — Second semester

Required of all seniors. Laws of equilibrium, pressure and flow of liquids; theory of the action of pumps.

9. Thermodynamics of Steam and Gas Engines — Professor Eddy

Three credits (three times per week) — First semester

Prerequisite, course 8. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors including use of steam tables, entropy diagrams, etc.

FOR CLASS OF 1910 ONLY:

7a′. Applied Mechanics — Professor Brooke, Assistant Professor Newkirk

Five credits (five hours per week) — First semester

Prerequisites the same as for course 7′. The principles of statics and dynamics, and the mechanics of the materials of construction.

8′. Hydraulics and Pumping Machinery — Professor Eddy, Professor Brooke, Assistant Professor Newkirk

Five credits (five hours per week) — Second semester

Required of all juniors. Prerequisite course 7′ or 7a′. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.M.E., Professsor of Mechanical Engineering
JOHN V. MARTENIS, M.E., Assistant Professor of Machine Design
PETER PETERSON, Instructor in Foundry Practice
EDWARD QUIGLEY, Instructor in Forge Work
WILLIAM H. RICHARDS, Instructor in Carpentry and Pattern Work
S. CARL SHIPLEY, B.S., Instructor in Machine Work
C. F. SHOOP, B.S., Instructor in Mechanical Engineering

SHOP WORK

1. CARPENTRY AND PATTERN MAKING — MR. RICHARDS
Four credits (six hours per week, twenty-four weeks)
First and second semester
Required of all freshmen.

Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.

2. BLACKSMITHING — MR. SHIPLEY, MR. QUIGLEY
Two credits (six hours per week, twelve weeks)
First or second semester
Required of all freshmen.

Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.

4. MACHINE AND BENCH WORK — MR. SHIPLEY
Three credits (six hours per week) First or second semester
Chipping, filing, machine work. Lectures and practice.

MACHINE DESIGN

11. PRINCIPLES OF MECHANISM — ASSISTANT PROFESSOR MARTENIS
Three credits (three hours per week, lectures and recitations)
First semester
Preparation: course M. 4.

The transmission of motion without consideration of the strength of parts. Gear wheels, linkages, belts, screws, epicyclic trains, parallel motions, quick-return movements.

12. KINEMATICS AND ELEMENTARY MACHINE DESIGN — ASSISTANT PROFESSOR MARTENIS
Three credits (six hours per week) Second semester
Preparation: course M. 4.

Graphical diagrams of the paths, speeds and accelerations of important mechanisms; centroids, analysis of mechanisms; construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.

13. MACHINE DESIGN — PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Five credits (ten hours per week) First semester
Open only to students pursuing course M. 7.

Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures, and drawing-room practice.

14a. **MACHINE DESIGN** PROFESSOR FLATHER, ASSISTANT PROFESSOR MARTENIS
Two credits (four hours per week) Second semester
Open only to those pursuing course 20.
Continuation of course 13. Rope driving; bevel gears, spiral gears.

STEAM ENGINEERING AND PRIME MOVERS

19. **STEAM BOILERS** ASSISTANT PROFESSOR MARTENIS
One credit (one hour per week) First semester
Senior year. Open only to students pursuing course M. 7.

Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

20. **STEAM ENGINE** PROFESSOR FLATHER
Three credits, (three hours per week) Second semester
Senior year, preparation: course M. 7.

Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

21. **GAS ENGINES AND PRODUCERS** MR. HERRICK
Two credits (two hours per week) Second semester
Senior year. Open to students pursuing course C. 6.

Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.

A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

METALLURGY

WILLIAM R. APPLEBY, M.A., Professor of Metallurgy
PETER CHRISTIANSON, B.S., E.M., Professor of Assaying
LEVI B. PEASE, B.Sc.Chem., M.S., Professor of Metallurgy

1. **ASSAYING** PROFESSOR APPLEBY AND ASSISTANTS
Eight credits (four lectures and eight laboratory hours per week)
Second semester
Open to students completing Mineralogy 1.
Determination of values of ores, metallurgical products and bullion.

3. **GENERAL METALLURGY AND METALLURGY OF IRON**
PROFESSOR CHRISTIANSON
Three credits (three lectures per week) First semester
Open to students completing 1.

Combustion, fuels, refractory material and furnaces. Lectures and recitations on metallurgy of iron.

4. **METALLURGY OF WROUGHT IRON AND STEEL** — PROFESSOR CHRISTIANSON
Three credits (three lectures per week) — Second semester
Open to students completing 3.

Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. **METALLURGY OF THE BASE METALS** — PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 4.

Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved in refining methods.

6. **METALLURGY OF THE PRECIOUS METALS** — PROFESSOR PEASE
Four credits (four lectures per week) — Second semester
Open to students completing 5.

Gold, silver and platinum. Methods and principles of cyanidation, chlorination, amalgamation, and lixiviation as applied to treatment of above.

MILITARY SCIENCE AND TACTICS

EDWARD SIGERFOOS, Ph.B., Captain U. S. A., Commandant

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of four battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about $15, and is as neat and economical dress as the student can obtain.

Drill is required of all men in the freshmen and sophomore classes.

Military drill may be taken voluntarily by others outside of the freshman and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

Freshman—Practical instruction in schools of the soldier, company and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore—Practical and theoretical instruction in schools of the company and battalion, advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

Junior and senior—Theoretical instruction—Advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

PHYSICAL CULTURE

For Men

DR. COOKE AND MR. FOSTER

A well-equipped gymnasium in charge of a professional medical director is open for the young men. The training and exercise is under the immediate oversight and authority of the medical director and is wholly with a view to the healthful physical development of the whole student body.

All young men are required to be examined by the medical director of physical culture upon registration and during the course as often as the indications of the physical condition may require.

The decision of the director will be either:

1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or
2. Mandatory, requiring the students to pursue the course of hygiene and physical exercise necessary for the proper care of health and the discharge of their duties as students.

Gymnasium work is required of all men in the freshmen class, one hour per week (in two half-hour periods, if the director so decides) throughout the year. The required work includes a course of lectures on personal hygiene during the first semester.

For Women

MISS BUTNER AND MISS MATSON

The course in physical culture is offered to the women of the University as a regular part of their work in the freshman year, and may be taken in any of the following years. A full year of work, in addition to the work required in this department, counts as a two-hour credit in the second semester of the senior year. The work consists of systematic exercises for the development of all parts of the body. Women pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse waist and bloomers, with the regulation gymnasium shoes. All suits must be of black material.

It is a common observation that students often enter the University with an imperfect physical development because of an excessive use of some muscles, while others are weakened through disuse. This occasions attitudes and movements that are unseemly in appearance and unhealthful in their general effect. The purpose of this course, therefore, is to develop a strong and symmetrical physique with a graceful and easy carriage. A physical examination is made of each student and physical measurements are taken in the fall and again in the spring.

In addition to the regular class work, sports and pastimes are open to all young women of the University. These include basket ball, battle ball, numerous other ball games, and also running games, all of which tend to cultivate the play instinct and give the nerve stimulus that comes from natural play.

PHYSICS

FREDERICK S. JONES, M.A., Professor of Physics
JOHN ZELENY, B.A., Ph.D., Professor of Physics
ANTHONY ZELENY, M.S., Ph.D., Assistant Professor of Physics
HENRY A. ERIKSON, E.E., Assistant Professor of Physics
ALOIS F. KOVARIK, B.A., Instructor in Physics

1. GENERAL PHYSICS PROFESSOR JOHN ZELENY
Three credits (three recitations per week) First semester
Open to sophomores, juniors and seniors.

Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics. The treatment is experimental rather than mathematical. The course is designed to give the student a general knowledge of the fundamental principles of the subject and will be found especially useful to those pursuing other sciences.

2. GENERAL LABORATORY PRACTICE — MR. KOVARIK

One credit (two hours laboratory work per week) — First semester

Open to sophomores, juniors and seniors.

Physical measurement in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods. This course is intended to accompany course 1.

3. GENERAL PHYSICS — PROFESSOR JOHN ZELENY

Three credits (three recitations per week) — Second semester

Open to sophomores, juniors and seniors.

Light, electricity and magnetism. This is the second part of a general course in physics. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, and radiation and the electrical constitution of matter are discussed and illustrated.

4. GENERAL LABORATORY PRACTICE — MR. KOVARIK

One credit (two hours laboratory work per week) — Second semester

Open to sophomores, juniors and seniors.

Physical measurements in light, electricity and magnetism, giving the student a knowledge of experimental methods. This course is intended to accompany course 3.

5. MECHANICS OF SOLIDS AND FLUIDS — PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK.

Four credits, (three recitations, one lecture or two hours laboratory) — First semester

Open to those who have completed course M. 1, 2.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.

6. HEAT, MAGNETISM AND ELECTROSTATICS — PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) — Second semester

Open to those who have completed course 5.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS — PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR A. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK.

Four credits (one lecture, two recitations and two hours laboratory) — First semester

Open to those who have completed course 6.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory) Second semester

Open to those who have completed course 5. Required of juniors.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

FOR CLASSES GRADUATING IN 1910-1911

The mathematics of the freshmen year is required as preparation for all courses in this department.

7′. ELECTRICAL MEASUREMENTS ASSISTANT PROFESSOR A. ZELENY

Three credits (four hours laboratory, one lecture per week) First semester

Open to juniors and seniors.

The course aims to give a thorough, practical knowledge of electrical instruments and of the fundamental electrical measurements. The system of electrical units is developed theoretically and experimentally.

RHETORIC

OSCAR W. FIRKINS, M.A., Instructor in Rhetoric
CHARLES W. NICHOLS, M.A., Instructor in Rhetoric
HELEN GRIFFITH, B.A., Assistant in Rhetoric
NELLIE A. WHITNEY, Assistant in Rhetoric

1. (a). RHETORIC MR. FIRKINS, MR. NICHOLS, MISS GRIFFITH, MISS WHITNEY

Six credits (three hours per week) First and second semesters

Open to all freshmen who have passed the entrance test in English.

This course includes the study of formal rhetoric, the writing of compositions, and the study and analysis of masterpieces of prose.

2. (a). RHETORIC MR. FIRKINS

Six credits (three hours per week) First and second semesters

Open to students who have completed course 1, and to sophomores of whom, at entrance, rhetoric was not required.

The course consists of a study of the short story in the first semester, and of the essay and forms of public address in the second semester. The writing of compositions and the keeping of a note book form a greater part of the work.

L

THE COLLEGE OF EDUCATION

College of Education.

FACULTY OF INSTRUCTION

CYRUS NORTHROP, LL.D., President
GEORGE F. JAMES, Ph.D., Dean and Professor ot Education
A. W. RANKIN, B.A., Professor of Education
FLETCHER HARPER SWIFT, Ph.D., Professor of Education
JOHN F. DOWNEY, M.A., C.E., Professor of Mathematics
JOHN G. MOORE, B.A., Professor of German
CHRISTOPHER W. HALL, M.A., Professor of Geology and Mineralogy
CHARLES W. BENTON, M.A., Litt.D., Professor of French
JOSEPH M. THOMAS, M. A., Professor of Rhetoric
JOHN CORRIN HUTCHINSON, B.A., Professor of Greek
HENRY F. NACHTRIEB, B.S., Professor of Animal Biology
JOHN ZELENY, Ph.D., Professor of Physics
GEORGE B. FRANKFORTER, Ph.D., Professor of Chemistry
WILLIS M. WEST, M.A., Professor of History
J. J. FLATHER, Ph.B., M. M. E., Professor of Mechanical Engineering
FRANCIS P. LEAVENWORTH, M.A., Professor of Astronomy
JOSEPH BROWN PIKE, M.A., Professor of Latin
SAMUEL G. SMITH, Ph.D., LL.D., Professor of Sociology
NORMAN WILDE, Ph.D., Professor of Philosophy
WILLIAM A. SCHAPER, Ph.D., Professor of Political Science
FREDERIC E. CLEMENTS, Ph.D., Professor of Botany
JOHN HENRY GRAY, Ph.D., Professor of Economics
FRANCIS SQUIRE POTTER, M.A., Professor of English
EDWARD VAN DYKE ROBINSON, Ph.D., Professor of Economics
CARLYLE M. SCOTT, Professor of Music
LOUIS J. COOK, M.D., Director of Gymnasium
JOHN B. JOHNSTON, Ph.D., Asssociate Professor of Neurology

EDWARD M. LEHNERTS, M.S., Assistant Professor of Geology

D. D. MAYNE, Principal of the School of Agriculture

JAMES BURT MINER, Ph.D., Assistant Professor of Philosophy and Psychology

INSTRUCTORS

MARGARET BLAIR, Domestic Art
ANNA M. BUTNER, Physical Culture
HENRIETTA CLOPATH, Drawing
CHARLES M. HOLT, B.A., Education
LAURA FRANCES KENDALL, Music
ALICE J. MOTT, Ph.D., Principal of the Practice School
W. H. RICHARDS, Sloyd and Woodwork
S. C. SHIPLEY, B.S., M.E., Machine Work and Iron work
JUNIATA SHEPPERD, Domestic Science

THE COLLEGE OF EDUCATION

The College of Education was authorized by a special enactment of the Legislature of Minnesota in 1905, and was established by the Regents of the University in the following year.

It offers both a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

ADMISSION

Entrance examinations are held only at the beginning of the college year. Students prevented from entering at that time may be admitted later if the circumstances justify this action. Such students are, however, at a great disadvantage, and all students expecting to enter the college are urged to be present at the beginning of the year.

All applicants should present themselves to the Registrar, who will furnish them with application blanks and directions how to proceed with their examinations and registration.

CONDITIONS OF ADMISSION

Students who plan to enter the College of Education are advised to consult with the Dean in regard to their course of study during their first year of college study. When they have completed with credit at least two full years of college work, they will be admitted to this college. During these two years they should have pursued one or more of the subjects which they expect to teach and, in addition, at least one course in general psychology.

ADMISSION TO ADVANCED STANDING

I. From other colleges

This college accepts records from all colleges of equal rank for credit to advanced standing. All candidates for graduation must, however, meet the conditions established by this college as indicated in a succeeding paragraph.

II. From Minnesota Normal schools

Graduates of the "advanced graduate course" of a Minnesota State Normal School who have completed in addition a full year of college work will be admitted to the College of Education, but will not be permitted to elect either course 5 or course 7 in education. They will be granted twelve credits toward graduation in addition to thirty credits previously allowed on the work of the first two college years. Individual graduates of either of the five-year courses of a Minnesota State Normal School will be admitted under the same regulations, but without the additional twelve credits above named.

UNCLASSED STUDENTS

Applicants who present satisfactory reasons for not taking the regular course may be admitted as unclassed students upon proof of fitness to profit by the work. The same general attainments are expected of these students as are required of those who enter the regular course. Unclassed students must take the same number of hours as regular students, except that men and women actually engaged in teaching may be allowed to enter for a less amount of work upon the approval of the committee in charge.

EXAMINATIONS

At the close of each semester examinations are held and students are reported as "excellent, ' "good," "passed," "incomplete," "conditioned," or "failed." An "incomplete" must be removed within one month from the opening of the following semester, or it becomes a "condition."

A "condition" not made up before the subject is offered again becomes a "failure," subject to rules governing failures. "Failures" must be pursued again in class. A student who at any time is deficient in more than half a year's work loses his class rank and is regarded as a member of the next lower class. Students whose absences in any term exceed four weeks in the aggregate are not permitted to take the term examinations without special permission of the faculty.

FAILURE TO KEEP UP WITH THE CLASS

Any student receiving conditions or failures in 60 per cent of the work the first semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the following year.

Any student failing to pass in one-half of the work of any year shall not be allowed to register until reinstated by action of the faculty upon recommendation of the committee on students' work.

FEES

All students in the college who are residents of the state, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, or twenty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. Save in the case of the first registration, the incidental fee is increased by twenty-five cents for each day's delay in registration, beginning with the first day set for recitations. The usual fees for shop work are required of students in manual training.

COURSE OF STUDY

The College of Education offers a two-year course of study leading to the degree of Bachelor of Arts (in Education). The preparation for teaching which is afforded in these two years, in addition to two years of previous collegiate study, is planned to include first of all a thorough grounding in the correct use of English, both spoken and written. No student should propose to go into his work without adequate training of this kind, no matter what subjects he himself expects to teach, and no one will be graduated from the College of Education who has not attained a satisfactory standard in this particular.

A second element in the preparation of the future teacher is found in the courses in general and educational psychology, in the history and the organization of schools, in educational theory, and in the practice of teaching. Courses in psychology and in the history of education must be pursued by all students, and additional courses are elective in the theory and the practice of elementary and of secondary teaching, in the history of secondary education, in school organization and law, and in school hygiene.

A third part of the teacher's training is found in the specific subjects which he proposes to teach. In this particular the standard in Minnesota schools is constantly rising, and year by year school trustees are asking of all high school teachers more definite and adequate preparation in the subjects assigned them. This preparation is not possible unless the prospective teacher selects his subjects early in the college course and effects also a desirable and natural combination. When this is done the work required for a bachelor's degree may be arranged to give both a liberal and a special training.

A third year of study leads to the degree of Master of Arts. The work of this year includes advanced studies in education and in philosophy, and in one or more of the subjects of the secondary curriculum, at the option of the candidiate. The course is planned especially for those holding the degree of Bachelor of Arts who desire to prepare themselves more carefully either for high school teaching or for work as principals and superintendents. Young men and young women who propose to take up this work permanently will find it advisable to do graduate study either immediately upon receiving the bachelor's degree or after a period of pracical experience in teaching.

THE DEGREE OF BACHELOR OF ARTS IN EDUCATION

The degree of Bachelor of Arts(in Education) is granted to candidates on the following conditions:

A. The completion of college courses amounting to one hundred and twenty-six (126) credits, in addition to the required exercises in drill, gymnasium and physical culture. The courses selected must be approved by the committee in charge. No student shall elect less than fifteen or more than eighteen hours per week without special permission.

A credit is one hour per week through one semester.

B. At least fifteen (15) credits shall be secured in Education, ncluding courses 1 and 2.

C. An amount of work shall be taken in at least three departments concerned with the studies of the secondary curriculum sufficient to secure one major and two minor recommendations. Each minor recommendation will require not less than twelve (12) credits and each major not less than eighteen (18) credits in one department.

D. Each candidate for graduation must show an average of scholarship through four years of college work indicated by at least as many marks of "good" as of "pass," and must be counted as "good" by the department which recommends him.

E. A maximum of twelve credits is elective from the laboratory and shop courses in the manual arts and agriculture, but, in addition, credit is allowed for allied courses toward the bachelor's degree, in the case of students who desire to specialize in manual training, domestic art, domestic science or agriculture.

GRADUATION "WITH DISTINCTION"

The bachelor's degree "with distinction" is granted to students of this college on the following conditions:

A. The degree "with distinction" is based on special excellence in the major subject.

B. Students who wish to be candidates for this degree must register before the beginning of the senior year, and are advised to register upon entering the college.

C. At the time of application the student must have an average of "good" in all of his previous work. (For the purpose of this count one "excellent" shall balance one "pass").

D. To receive the degree "with distinction" the student must meet all the conditions applying to the ordinary degree, must show a record higher than "pass" in four-fifths of all his work, must present a satisfactory thesis upon his major subject by May first of the senior year, must comply with the special requirements of the department chosen, must be recommended to the faculty for special excellence, and be approved by the vote of the faculty.

OBSERVATION AND PRACTICE TEACHING

The critical observation of good teaching and the practice of teaching under skilled supervision form a most important part of the preparation of the teacher. In connection with two courses on the practice of elementary and secondary teaching, opportunity has been given students during the past two or three years to observe and to discuss the best methods of teaching employed in the public schoos of Minneapolis, St. Paul, and adjacent towns. This plan was adopted as the only feasible substitute at that time for adequate opportunities in the way of observation and of practice. These opportunities, it was recognized from the first, can be furnished only in a school organized under the direct control of this college.

In November, 1907, a small school was installed in temporary quarters provided by the regents, and during that academic year classes were conducted in seventh grade and in eighth grade work. In September, 1909, the school will, it is expected, be ready to enroll pupils from the seventh grade to the tenth grade inclusive, and thereafter, as facilities may be organized, the courses of the school will be extended up through the high school years and down through the elementary years. The primary purpose in this school is to afford prospective high school teachers an opportunity for seeing the work of the secondary schools conducted under normal conditions in as efficient a way as possible, in order that they may gain by observation and, to some extent, by practice familiarity with the instruction and management proper to a school of this grade. In addition, a fully graded elementary school, with kindergarten, ungraded room, and a three grade group is planned as a place of observation and practice for prospective school principals and superintendents.

The elementary and high school for observation and practice in connection with the training of teachers is the prime condition of success. To organize this adequately means buildings of considerable size, suitable and sufficient furniture and equipment, school libraries, laboratories, shops, gardens, and playgrounds. To secure this is the first aim and desire of the college. Meanwhile, the fullest use will be made of the temporary facilities, which are all that, during this year, the governing board is able to provide.

COMMERCIAL TRAINING

No definite course is now prescribed for those who are planning to teach business subjects (including commercial geography) in the high schools, but all are advised to take at least a three years' course in economics and to elect courses also in political science and in history. Each student is advised further to select work in rhetoric, in English literature, and in one modern foreign language.

Students who expect to teach commercial geography will do well to select courses in some of the following subjects: essentials of physical geography, advanced general chemistry, industrial botany, economic zoology, applied geology, and anthropology. In economics, courses are suggested in economic geography, in industrial and commercial history, the principles of accounting, and the elements of business law. These are general suggestions for those who wish to prepare themselves for the teaching of commercial subjects, but each candidate should very early consult with the committee in regard to the outlining of his entire course.

MANUAL TRAINING

The increasing demand for teachers who are able not only to handle two or three of the ordinary high school subjects, but also to direct the manual training work of the elementary and of the high school grades, is straining the facilities of our training schools for teachers in Minnesota. This college is not yet in a position to provide adequate facilities, but in co-operation with the College of Engineering is able to offer at least introductory courses of this kind. Young men who desire to prepare themselves for manual training work may register in the college for courses of this description. By utilizing the shops on the campus and other opportunities here offered, future manual training teachers may prepare themselves both in woodwork and in ironwork. With these, students may also unite courses in descriptive geometry, in mechanical drawing, and in allied subjects, and in this way they may secure a fairly satisfactory preparation for the teaching of these branches in connection with some of the regular high school studies.

DOMESTIC ART AND DOMESTIC SCIENCE

These subjects are being added each year to the school course in an increasing number of Minnesota towns. So far, superintendents and boards of education have experienced considerable difficulty in securing teachers in these lines. The larger towns and cities can engage trained teachers and supervisors, but in the smaller communities on the first introduction of these subjects, it is necessary to entrust them to teachers able to give instruction in some high school studies.

A good opportunity, therefore, lies before prospective teachers who, in addition to a preparation in the ordinary studies of the high school course, will prepare for the direction of these subjects. Students who are interested in this line of work will be directed early in their college course in the selection of foundation work in geography, chemistry, physics, and other related subjects, and will thus be prepared to elect during the last year or two the more technical instruction in domestic art and domestic science.

SATURDAY CLASSES AND COLLEGE EXTENSION COURSES.

The college has offered during the past year a number of professional courses for those actually engaged in teaching, and most of this work has been organized for Saturdays and for the latter part of the afternoon on other days of the week. Teachers of Minneapolis and of St. Paul have registered in considerable numbers for this work, and teachers have come also from smaller adjacent towns. The courses arranged on the campus of the university for teachers will be continued and increased in number during the coming year.

Extension courses by members of the college faculty were given during 1907–8 and 1908–9 in St. Paul under the auspices of a citizens' committee, and under the immediate direction of the city superintendent. Lectures on literature, anthropology, on general and on education psychology, on school administration, and on the history of education were given each week through the school year, and the enrollment in the courses was large. The college plans to make available, as far as possible, its resources in teachers and equipment to all the school systems of Minnesota, particularly those of towns in the neighborhood of the Twin Cities. It will be possible, from time to time, to secure from the college a series of weekly or fortnightly lectures upon almost any of the ordinary branches of higher study.

THE UNIVERSITY SUMMER SCHOOL

The summer school which has been held at the university for more than fifteen years is under the direction, not of the regents, but of the state department of public instruction. There is no official connection, therefore, between the summer school and the College of Education, but the school has been planned for many years especially to suit the needs and desires of Minnesota teachers, and in the college section the courses are arranged for teachers in state high schools who desire further preparation for their work. At the same time graduate courses are provided in connection with the school for teachers, principals, and superintendents who cannot attend during the academic year, and undergraduate courses leading to the degree of bachelor of arts are also provided for teachers. Men and women who have not completed the requirements for the bachelor's degree are enabled in this way to supplement their previous studies and to bring themselves where a few months of resident study will enable them to finish their college course. The courses provided during this six weeks' session in June and July are given to a considerable extent by members of the faculty of this college.

LIBRARY FACILITIES

The professional library of the college contains a large selection of works on the various phases of education and is at the service not only of the students of the college, but of visiting teachers. During the past year a text-book collection was added covering the field of secondary schools. As soon as possible this illustrative library will be supplemented by model equipment of other kinds, thus offering concrete suggestions on questions of school furnishing and supplies.

Under certain restrictions the use of part of the professional library will presently be made possible for non-resident students.

THE DEGREE OF MASTER OF ARTS

Graduates of the University of Minnesota and of other institutions of equal rank will be admitted to work leading after one year of study to the degree of Master of Arts, upon the usual conditions attaching to that degree. They will be expected, however, to have given considerable attention in their collegiate work to psychology, and to the history, the theory, and the practice of teaching.

Men and women actually engaged in teaching in Minnesota and possessing the bachelor's degree from a college of good rank will be allowed to pursue graduate studies in absentia. For non-resident students a special course is arranged with education as the major subject. Two years are required and three are allowed for the completion of this work.

THE UNIVERSITY TEACHER'S CERTIFICATE

The University Teacher's Certificate is granted to all graduates of the College of Education and to those graduates of the College of Science, Literature, and the Arts who complete one course in general psychology and three courses in education, including courses 1 and 2, and who secure on the basis of excellent scholarship one major recommendation as qualified for teaching from a department of that college concerned with some branch of the secondary curriculum.

SPECIAL LECTURES

In addition to the courses announced for the College of Education, special lectures will be given from time to time, open to all students, by men closely identified with public education in Minnesota. Educational organization, ideals, and methods will be treated from the point of view of those concerned with the state department of public instruction, the inspection of state graded and high schools, the state normal schools, city school systems, and with the conduct of schools in smaller communities.

Public lectures will be given also by men familiar with the educational conditions, experiments, and tendencies in other states.

THE EDUCATIONAL CLUB

This organization is made up of those giving instruction in the College of Education and of students registered for advanced work. Meetings are held from time to time during the college year for the discussion of current questions in education and for reports and discussion upon recent educational literature, books, magazines and journals.

COURSES OF INSTRUCTION

Fuller descriptions of some of the courses offered may be found in bulletins of the College of Science, Literature and the Arts, the College of Engineering, the School of Chemistry, and the College of Agriculture.

RELATED DEPARTMENTS

The table below gives groups of related departments, but for convenience of reference in the departmental statements which follow the departments are arranged in alphabetical order, after the statements in education.

I. English Language and Literature
    (a) English, (b) Comparative Philology, (c) Rhetoric
II. Ancient Languages and Literatures
    (a) Greek, (b) Latin, (c) Semitic Languages
III. Modern Languages and Literatures
    (a) German, (b) Romance Languages, (1) French, (2) Spanish, (3) Italian, (c) Scandinavian Languages
IV. Biological Sciences
    (a) Animal Biology, (b) Botany, (c) Paleontology
V. Physical Sciences
    (a) Chemistry, (b) Geology and Mineralogy, (c) Physics
VI. Pure and Applied Mathematics
    (a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics
VII. Philosophy, Education, and Anthropology
    (a) Philosophy and Psychology, (b) Education, (c) Anthropology

VIII. Social Sciences
    (a) Economics and Political Science, (b) History, (c) Sociology
IX. Fine Arts
    (a) Drawing, (b) Music
X. Agriculture, Domestic Art and Science, and Manual Training.

Courses of Study.

EDUCATION

George F. James, Professor, Head of the Department of Education
Albert W. Rankin, Professor
Fletcher Harper Swift, Professor
James Burt Miner, Assistant Professor
Alice J. Mott, Instructor
Charles M. Holt, Instructor

1. History of Education to the Reformation — Mr. Swift
Three credits (three hours per week) — First semester
Open to juniors and seniors

An introductory study in the history of education conducted by lectures, assigned readings, discussions and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of the different types of schools in Medieval times, the rise of the university and of the humanistic schools of the Renaissance.

2. History of Modern Education — Mr. Swift
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

3. Educational Psychology — Mr. Miner
Three credits (three hours per week) — Each semester
Open to juniors who have completed philosophy 1.
Identical with philosophy 2.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. Secondary Education — Mr. James
Three credits (three hours per week) — First semester
Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports and discussions.

5. PRINCIPLES AND ORGANIZATION OF ELEMENTARY TEACHING — MR. RANKIN
Three credits (three hours per week) — First semester
Open to seniors who have completed courses 1 and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions and reports. It is planned for all students who expect to teach in the high schools or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the university.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING — MR. RANKIN
Three credits (three hours per week) — Second semester
Open to seniors who have completed courses 1 and 2.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

7. THE THEORY OF EDUCATION — MR. JAMES
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed philosophy 1.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching. No credit is given in this course to graduates of normal schools who have received one year's credit at the university.

8. SCHOOL ADMINISTRATION — MR. RANKIN
Three credits (three hours per week) — First semester
Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports and discussions; the organization of school systems, the work of school boards, superintendents, principals and teachers, school buildings, and hygiene. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION — MR. RANKIN
Three credits (three hours per week) — Second semester
Open to seniors; intended only for students with experince in teaching.

An advanced course treating of the duties of school principals and superintendents. Credit will not be given both for course 8 and for course 9.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS — MR. JAMES
Three credits (three hours per week) — Second semester
Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England and the United States, with special reference to principles and methods of administration. Elementary, secondary and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports and discussions.

11. MODERN EDUCATIONAL THEORIES — MR. JAMES
Three credits (three hours per week) — Second semester
Open to seniors who have completed courses 1 and 2 and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.

12. CURRENT PROBLEMS IN ELEMENTARY TEACHING — MR. RANKIN
Two credits (two hours per week) — First semester
Open to seniors who have completed course 5 and to graduate students.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor, through readings, the visiting of schools and through class discussions.

13. EDUCATIONAL CLASSICS — MR. JAMES
Two credits (two hours per week) — First semester
Open to seniors who have completed courses 1 and 2, and to graduates.

A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.

14. CURRENT PROBLEMS IN SECONDARY TEACHING — MR. RANKIN
Two credits (two hours per week) — Second semester
Open to seniors and to graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching experience, who wish to pursue a theoretical and a practical study of some current problem in connection with secondary teaching. The course will be conducted by lectures, class discussion, readings and by the visiting of schools.

15. PROBLEMS IN SCHOOL ADMINISTRATION — MR. JAMES
Two credits (two hours per week) — Second semester
Open to seniors and to graduate students who have completed courses 1 and 2.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions falling within the proposed field.

16. SCHOOL SANITATION — MR. RANKIN
Two credits (two hours per week) — First semester
Open to seniors and to graduate students.

This course will be conducted by text, by lectures, and by investigation into the problems of school lighting, heating, and ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.

17. ORGANIZATION OF HIGHER EDUCATION — MR. JAMES
One credit (one hour per week) — Second semester
Open to seniors and to graduate students who have completed courses 1 and 2

This course is intended for students who are interested in the general problems of educational administration, and who look forward later to college teaching. It includes a historical sketch of the development of the American University, with discussions of modes of organization and administration, problems of departmental management, and questions of class instruction.

18. **PRACTICE TEACHING** — MR. RANKIN and MISS MOTT

Three credits (three hours per week) — Each semester

Open only to seniors and to graduate students.

The registrar will accept enrollment only on written permission to the student from the instructor in charge, specifying one of the morning periods to be kept free for this work on each day of the week; five periods of teaching and Saturday conference; not counted as one of the five courses in education required for graduation.

This is a course in observation and practice teaching, related for the present to the work of advanced grammar and first high school grades. As facilities permit, the work of other grades will be added.

19 **TECHNIQUE OF READING** — MR. HOLT

Three credits (three hours per week) — Each semester

Open only to a limited number of seniors after individual tests by the instructor.

This course is given in two sections, for those who are specializing in this work, and for those noticeably deficient in voice control.

20. **HISTORY OF RELIGIOUS EDUCATION** — MR. SWIFT

One credit (one hour per week) — First semester

Open to juniors, seniors, and graduate students.

An introductory study of the development of the religious consciousness and of the aim, means, and methods of religious instruction among certain types selected from ancient and modern civilizations.

21. **PRINCIPLES OF RELIGIOUS EDUCATION** — MR. SWIFT

One credit (one hour per week). — Second semester

Open to juniors, seniors, and graduate students.

A study of the most important principles of education, viewed from the standpoint of their relation and application to religious activities and institutions, and also to the means, methods, and materials of religious instruction.

AGRICULTURE

D. D. MAYNE, Principal of the School of Agriculture

1. **ELEMENTS OF AGRICULTURE** — MR. MAYNE

Three credits (three hours per week) — First semester

Open to juniors and seniors.

This course is planned to meet the increasing demand for a knowledge of the elements, at least, of agriculture on the part of graded school principals, rural school teachers, county superintendents of schools, and others concerned with education in the agricultura sections of the state. The course is given at the School of Agriculture on Tuesday and Saturday afternoons.

2. **ELEMENTS OF AGRICULTURE** (Continued) — MR. MAYNE AND ASSISTANTS

Three credits (three hours per week) — Second semester

Open to juniors and seniors.

This is a continuation of course 1 and is planned to give the student some familiarity with the underlying principles and the simple processes connected with various forms of agricultural work. Tuesday and Saturday afternoons. Mr. Mayne will have the co-operation of others connected with this branch of the University.

Students who are interested are advised to read the bulletin of the School of Agriculture and to note the various opportunities which are there afforded, for all of these will be made available to some extent in connection with these courses.

ANIMAL BIOLOGY

HENRY F. NACHTRIEB, Professor, Head of the Department of Animal Biology
CHARLES P. SIGERFOOS, Professor
OSCAR W. OESTLUND, Assistant Professor
HAL DOWNEY, Assistant Professor
JOHN C. BROWN, Assistant Professor
CHARLES E. JOHNSON, Assistant
PETER OKKELBERG, Assistant

1. **GENERAL ZOOLOGY** MESSRS. SIGERFOOS, OESTLUND, BROWN, DOWNEY, JOHNSON AND OKKELBERG

Six credits (three hours per week) Both semesters

Open to all; the laboratory fee is three dollars per semester.

Lectures, quizzes, and laboratory work. Text-book—Hertwig's Manual of Zoology. This course should be taken in the first or the second college year by all who expect to teach the subject.

2. **MORPHOLOGY OF INVERTEBRATES** MESSRS SIGERFOOS AND JOHNSON

Six credits (six hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit will be given for the first; the laboratory fee is three dollars per semester.

3. **ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY** MESSRS. NACHTRIEB AND DOWNEY

Six credits (six hours per week) Both semesters

Open to those who have completed course 1; the laboratory fee is three dollars per semester.

4. **COMPARATIVE ANATOMY OF VERTEBRATES** MESSRS. BROWN AND JOHNSON

Six credits (six hours per week) Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

5. **GENERAL PHYSIOLOGY** MR. NACHTRIEB

Six credits (three hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functional features of living substance and the cell, present conditions and expressions of life, and the theories of the origin of life and death. In the second semester the life of the cell is considered in its relations to that of other cells, and the course is concluded with special reference to the teaching of physiology in our high schools.

Demonstrations and simple experiments constitute a part of the course in both semesters.

13. **Teacher's Course** — **Mr. Nachtrieb and Assistants**
One credit (one hour per week) — First semester
Open to those who have completed a minor in zoology; given in alternate years.

Lectures and discussions on the ends to be attained through courses in general zoology, and on the methods and means by which such ends may be gained.

15. **Elements of Entomology and Ornithology** — **Messrs Oestlund and Brown**
Six credits (six hours per week) — Both semesters
Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

This course is planned with special reference to candidates for the teacher's certificate. During the first semester the class meets with Mr. Oestlund during the third and fourth hours on Monday, Wednesday and Friday. During the second semester the class meets with Mr. Brown on Monday, Wednesday and Friday at the hours arranged with him.

For a Major, courses 1 and 15 and one course selected from courses 2, 3, 4, and 5 are required, with an average of at least good, together with six credits in botany. Course 13 in zoology is recommended.

Students may select additional work, on the approval of the head of the department, from other courses announced in animal biology.

ASTRONOMY

Francis M. Leavenworth, Professor, Head of the Department of Astronomy

1. **General Astronomy** — **Mr. Leavenworth**
Six credits (three hours per week) — Both semesters
Open to those who have completed mathematics 4 (trigonometry).

The study of the general principles of astronomy, illustrated by lantern slides and telescopic observations. This course may be combined with course 2.

2. **Observatory Practice** — **Mr. Leavenworth**
Six credits (three hours per week) — Both semesters
Open to those who have completed or are taking course 1.
Work at the observatory in connection with course 1.

3. **Practical Astronomy** — **Mr. Leavenworth**
Six or twelve credits (three or six hours per week) — Both semesters
Open to juniors or seniors who have completed course 1 and mathematics 7, 9, and 10.

The theory and use of astronomical instruments in determining time, latitude, longitude, and positions of heavenly bodies; astronomical photography, with measurements of plates; study of the method of least squares.

BOTANY

Frederick E. Clements, Professor, Head of the Department of Botany
Josephine E. Tilden, Assistant Professor
Carl Otto Rosendahl, Assistant Professor
Frederick K. Butters, Instructor
Ned L. Huff, Instructor
Alice Misz, Assistant

1. GENERAL BOTANY — MESSRS. CLEMENTS, HUFF, AND BUTTERS AND MISS MISE
Six credits (six hours per week) — Both semesters

Open to all; both semesters must be completed before credit will be given for the first semester; the laboratory fee is three dollars per semester.

2. ADVANCED BOTANY — MESSRS. CLEMENTS AND ROSENDAHL
Six credits (six hours per week) — Both semesters

Open to those who have completed course 1; the laboratory fee is three dollars per semester.

3. PLANT PHYSIOLOGY AND ECOLOGY — MESSRS. CLEMENTS AND HUFF
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2; the laboratory fee is three dollars per semester.

4. ALGAE — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

5. FUNGI — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

6. MOSSES AND FERNS — MESSRS ROSENDAHL AND HUFF
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

11. INDUSTRIAL BOTANY — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to technical students who have completed course 1, and to academic students who have completed courses 1 and 2.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

16. TEACHERS' COURSE—Plant Studies and Methods — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are taught, and not from the university point of view. The material is taken up in detail, in its proper sequence, and training in method is afforded, as far as possible, by practice in the elementary school of the College of Education.

FOR A MAJOR, eighteen credits, with an average of at least good, are required, including courses 1 and 2 and one advanced course covering two semesters, together with six credits in zoology. Courses 11 and 16 in botany are recommended.

Students may select additional work, on the approval of the head of the department, from other courses announced in botany.

CHEMISTRY

GEORGE B. FRANKFORTER, Professor, Head of the Department of Chemistry
CHARLES F. SIDENER, Professor
EDWARD E. NICHOLSON, Assistant Professor
IRA H. DERBY, Assistant Professor
LILLIAN COHEN, Instructor
FRANCIS C. FRARY, Instructor
JOHN A. HANDY, Instructor
WALTER BADGER, Assistant

1. GENERAL CHEMISTRY — MISS COHEN AND MR. BADGER

Six credits (six hours per week) — Both semesters

Open to all who do not present any entrance credits in chemistry, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.

Recitations and laboratory work; the course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.

2. ADVANCED GENERAL CHEMISTRY — MR. FRANKFORTER, MISS COHEN AND MR. BADGER

Six credits (six hours per week) — Both semesters

Open to all who have completed a satisfactory course in general chemistry; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.

Lectures and laboratory work; the ground covered includes an introduction to physical and technological chemistry, with an exhaustive study of the chemical elements.

3. QUALITATIVE ANALYSIS — MESSRS. NICHOLSON AND FRARY

Six credits (six hours per week) — Both semesters

Open to those who have completed course 2; the laboratory fee is five dollars per semester.

Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and the acids, with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

4. QUANTITATIVE ANALYSIS — MR SIDENER AND ASSISTANTS

Six credits (six hours per week) — Both semesters

Open to those who have completed course 3; the laboratory fee is seven dollars per semesters.

The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester; followed the second semester by a discussion of standard solutions and the necessary stoecheometric calculations, with laboratory work in volumetric analysis.

5. **Organic Chemistry** Messrs. Frankforter, Derby, Handy and Assistants
Nine credits (three lectures and twelve hours of laboratory work per week)
Second semester

Open to those who have completed course 3; the laboratory fee is ten dollars.

This course includes the aliphatic and aromatic series, with the preparation of the more important compounds.

6. **Theoretical Chemistry** Mr. Derby
Two credits (one lecture and one recitation per week) Second semester

Open to those who have completed course 5;

The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.

26. **Teacher's Course** Miss Cohen
Two credits (two hours per week) Second semester

Open to those who have completed course 3; the laboratory fee is three dollars.

The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

For a Major, courses 2 and 3, course 4 or course 5, and course 26, with an average of at least good, are required, together with six additional credits in physical science.

DOMESTIC ART AND DOMESTIC SCIENCE

Margaret Blair, Instructor
Juinata L. Shepperd, Instructor

These courses cover specifically the science and art of the home. In the reactionary movement away from the theoretical and toward the practical in education, the need of teachers of scientific and artistic home-making has become marked. To meet this demand the following courses have been organized.

DOMESTIC ART

Domestic art has to do with the very beginning of home-making, the selection of a site, the adaptation of architecture to the needs of the family, the choice of materials, colors, etc., and their relation to the surroundings, the interior of the home, its furniture and keeping. All of these topics are viewed in both their economic and their social aspect. In addition a full course is offered in needle-work in all its branches.

1. **A Study in Textiles** Mrs. Blair
Three credits First semester

Open primarily to those who expect to teach this subject.

Animal and vegetable fibres, weaves and dyes, testing fabrics for household use and personal wear, the hygiene values of various fabrics, harmony of color. This course is designed especially to assist the teaching of sewing in graded schools, and includes the preparation, explanation and making of models suited to grade work in the public schools. This course will be given upon Monday and Thursday afternoons, at the School of Agriculture.

2. DESIGN AND GARMENT DRAFTING — MRS. BLAIR
Three credits — Second semester
Open to those who have completed course 1.

This course is in the design and drafting of children's and adults' garments and includes also a series of lectures upon the home.

This course will be given on Monday and Thursday afternoons at the School of Agriculture.

DOMESTIC SCIENCE

Domestic science has to do with the chemistry of the table, the science of cooking, and the housewifely care of the kitchen and dining-room; household accounts and the administration of the home upon an economical basis, are discussed in their various relation to these courses, and the effort is toward system, economy and effectiveness in home management. Students who look forward to teaching are trained to assist in the teaching or supervision of this work in city schools or to have the entire charge of the work, in connection with other teaching, in the smaller high schools.

1. LAUNDERING AND FOOD ECONOMICS — MISS SHEPPERD
Three credits — First semester
Open primarily to those who expect to teach this subject.

In this course the subject of domestic and commercial laundering and cleaning is first considered, with a study of removing stains, dyeing, setting colors, cleaning delicate fabrics, the use of cleaning agents, starches and bluing. By far the larger part of the semester is given to a study of food economics, with a consideration of all phases of the selection of food materials and the preparation of food. The course is conducted by means of lectures, readings, with the writing of a thesis, and by full individual practical experience in all parts of the work.

The course is given on Wednesday and Friday afternoons at the School of Agriculture.

2. MANAGEMENT OF KITCHEN AND DINING ROOM — MISS SHEPPERD
Three credits — Second semester
Open to those who have completed course 1.

(a) The kitchen equipment, sanitation, labor saving devices, etc.
(b) The dining room, equipment, furniture, decorations, management, etc.
(c) Household inventories, bills of fare, fancy cookery, etc.

The above course is made, as far as possible, both practical and scientific. It requires three hours of work on each of two afternoons. Students who are interested in this line are advised to read a fuller description, which will be found in the Bulletin of the School of Agriculture.

DRAWING

HENRIETTA CLOPATH, Instructor
MAUD H. STEWARD, Assistant

1. Drawing and Painting in Representation — Miss Clopath
Six credits (six hours per week) — Both semesters

Open to sophomores with the permission of the instructor, juniors, and seniors.

Drawing of plant-form and landscape in pencil, water color, and charcoal; the study of perspective and the drawing of still life; drawing from the cast and sketching from life.

2. Advanced Drawing and Painting — Miss Clopath
Six credits (six hours per week) — Both semesters

Open to sophomores, juniors, and seniors who have completed course 1.

More advanced work in cast drawing; still life studies and figure pose in black and white and in color.

3. Design — Miss Steward
Six credits (six hours per week) — Both semesters

Open to juniors and seniors who have completed course 1 or its equivalent.

The study of pure design, including arrangement of lines, tones, and colors in accordance with the principles of harmony, balance, and rhythm; and of design in representation, including the fundamental relation of design to pictorial art, composition as applied to plant form, landscape, still life, and life drawing, compositions of the masters, and the making of original compositions.

4. Design — Miss Steward
Six credits (six hours per week) — Both semesters

Open to juniors and seniors who have completed course 3.

Advanced composition; book decoration with especial attention to lettering; designs for stained glass; and design applied to leather, pottery, metal, and embroidery

5. Drawing as Related to Education — Miss Clopath
Six credits (six hours per week) — Both semesters

Open to juniors and seniors who have completed courses 1 and 3.

Exercises in all the different kinds of art work used in the schools; advanced work in black and white and in color.

6. The Teaching of Drawing — Miss Clopath
One credit (two hours per week) — Second semester

This course is conducted by lectures and collateral reading on the methods and value of drawing, as revealed through a study of the instincts and mental processes of the child.

ECONOMICS AND POLITICAL SCIENCE

John H. Gray, Professor, Head of the Department of Economics and Political Science
Edward V. Robinson, Professor
William A. Schaper, Professor
Raymond V. Phelan, Instructor
Cephas D. Allin, Instructor
John L. Coulter, Instructor

ECONOMICS

1. Elements of Economics — Messrs. Robinson, Phelan, and Coulter

Three credits (three hours per week) Each semester

Open to sophomores, juniors and seniors.

Designed for those who desire a general knowledge of economics, and as an introduction to the more advanced courses offered in the department.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems; McVey's Outline and a text-book, supplemented by lectures and problems, with a weekly quiz.

2a. ECONOMIC GEOGRAPHY OF THE UNITED STATES MR. ROBINSON

Three credits (three hours per week) First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. Text-book, supplemented by lectures and reports.

2b. ECONOMIC GEOGRAPHY OF FOREIGN COUNTRIES MR. ROBINSON

Three credits (three hours per week) Second semester

Open to those who have completed course 2a.

A study of the natural resources, chief industries, commercial products, and commercial relations of the leading foreign countries.

3a. MODERN INDUSTRIAL AND COMMERCIAL HISTORY OF EUROPE MR. GRAY

Three credits (three hours per week) First semester

Open to sophomores, juniors, and seniors.

The industrial and commercial development of the chief European countries since the middle of the 18th century, with special attention to Great Britain.

3b. THE INDUSTRIAL AND COMMERCIAL HISTORY OF THE UNITED STATES MR. GRAY

Three credits (three hours per week) Second semester

Open to those who have completed course 3a.

Courses 3a and 3b are conducted each with a text-book, supplemented by lectures, prescribed topical readings, and written reports.

4. ADVANCED ECONOMICS MR. ROBINSON

Three credits (three hours per week) Second semester

Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution. Assigned readings, reports, and discussions.

5a. MONEY AND BANKING MR. PHELAN

Three credits (three hours per week) Each semester

Open to those who have completed course 1.

The history and theory of money, nature and uses of credit, functions of banks, foreign exchange. Lectures, text-book, assigned readings, and discussions.

5b. FINANCIAL HISTORY OF THE UNITED STATES. MR. PHELAN

Three credits (three hours per week) Second semester

Open to those who have completed courses 1 and 5a.

The main lines of our financial development, including our monetary and banking history. Lectures, text-book, assigned readings and topics, and discussions.

6. PUBLIC FINANCE MR. ROBINSON

Three credits (three hours per week) First semester

Open to those who have completed course 1.

The development of the state as an economic organism. Text-books, supplemented by lectures and assigned readings.

7. **PROBLEMS OF TAXATION** — MR. ROBINSON
Three credits (three hours per week) — Second semester
Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, based on Seligman and reports of state tax commissions, with lectures and reports on special topics.

POLITICAL SCIENCE

1. **ELEMENTS OF AMERICAN GOVERNMENT** — MESSRS. SCHAPER AND ALLIN
Three credits (three hours per week) — First or second semester
Open to sophomores, juniors, and seniors.

An elementary course in American government, intended as a preparation for the advanced courses in political science, for teaching in secondary schools, and for good citizenship. Text, lectures, and special topics.

2. **COMPARATIVE GOVERNMENT** — MR. ALLIN
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

A comparative study of the organization and working of the governments of the great European powers of to-day. Text, with lectures and assigned readings.

3. **THE ELEMENTS OF JURISPRUDENCE** — MR. SCHAPER
Three credits (three hours per week) — First semester

A study of those human relations requiring legal regulation considered from the American point of view; intended for active citizenship and for the study of law. Text, cases, lectures, and assigned readings.

7. **MUNICIPAL ADMINISTRATION** — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

A comparative study of modern city charters and methods of administration. Text, lectures, and special topics.

8. **THEORY OF THE STATE** — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed course 1 and course 2 or course 15.

A study of the theory of the state, the origin, nature, purpose, and justification of the state. Text-book, with lectures and topical readings.

9. **POLITICAL PARTIES** — MR. SCHAPER
Two credits (two hours per week) — First semester
Open to those who have completed courses 1 and 2.

An advanced course in political parties, their origin, development, and function. Text, lectures, and special topics.

13. **TEACHERS' COURSE IN GOVERNMENT** — MR. SCHAPER
One credit (one hour per week) — Second semester
Open to students of suitable preparation who intend to teach American government in the secondary schools.

Lectures and the examination of text-books, maps, and other materials useful to teachers.

15. STATE AND LOCAL ADMINISTRATION — MR. SCHAPER
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

A special course in the problems of our state and local governments. Lectures, cases, and special topics.

FOR A MAJOR: in commercial subjects, eighteen credits in economics, with an average of at least good, are required, together with twelve credits in political science and six credits selected from history and sociology; in government, eighteen credits in political science, including course 13, with an average of at least good, are required, together with twelve credits in economics and six credits selected from history and sociology.

The attention of students who expect to teach history and American government or commercial subjects is called to courses 2a, 2b, 3a, 3b, 5a, and 5b in economics and to courses 2, 3, 7, 9, 13, and 15 in political science. All of these courses are open for election, on the approval of the head of the department, as well as the other courses announced in economics and political science.

ENGLISH

RICHARD BURTON, Professor, Head of the Department of English
FREDERIC KLAEBER, Professor
FRANCES SQUIRE POTTER, Professor
JOSEPH W. BEACH, Assistant Professor
MARY GRAY PECK, Assistant Professor
OSCAR W. FIRKINS, Assisistant Professor

1. OUTLINE OF ENGLISH LITERATURE — MISS PECK AND MR. BEACH
Three credits (three hours per week) — First semester
Open to all.

Full credit only for freshmen, who must complete course 2 before credit for this will be allowed. Not credited toward a major in English.

An outline sketch of the main personalities of English literature, from the earliest times to the present.

2. OUTLINE OF AMERICAN LITERATURE. — MR. BURTON AND MISS PECK
Three credits (three hours per week) — Second semester

Open to freshmen who have completed course 1, and at half credit to sophomores, juniors, and seniors; not credited toward a major in English.

A study of the salient figures of our native literary development; special attention is given to contemporary writers.

3. EARLY ENGLISH — MESSRS. KLAEBER AND BEACH
Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors. The first semester is required of all who take a major or obtain a teacher's certificate in English.

A study of the language and reading of representative selections of Old English prose and poetry; the relation to the modern English will be particularly emphasized

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE — MR. KLAEBER
Two credits (two hours per week) — First semester

Open to sophomores, juniors, and seniors who have completed the first semester of course 3; alternates with course 5.

An outline of middle English grammar, including the interpretation of selected texts.

5. PIERS THE PLOWMAN — MR. KLAEBER

Two credits (two hours per week) — First semester

Open to sophomores, juniors, and seniors who have completed the first semester of course 3; alternates with course 4; not given in 1908-9.

6. CHAUCER — MISS PECK, MR. BEACH AND MR. FIRKINS

Three credits (three hours per week) — First semester

Open to sophomores.

A study of the grammar and literary forms of fourteenth century English, with selected readings from Chaucer's works; special attention is given to the Canterbury Tales.

7. SPENCER — MISS PECK, MR. BEACH, AND MR. FIRKINS

Three credits (three hours per week) — Second semester

Open to sophomores.

8a. OUTLINE OF EIGHTEENTH CENTURY LITERATURE — MR. BEACH

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed one year of work in English; not given in 1909-10.

8b. THE ENGLISH HUMORISTS — MR. BEACH

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed one year in English.

Courses 8a and 8b will be given in alternate years.

9. OUTLINE OF NINETEENTH CENTURY LITERATURE — MR. BEACH

Three credits (three hours per week) — Second semester

Open to sophomores and juniors who have completed one year of work in English.

12. THE ENGLISH NOVEL — MRS. POTTER

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed one year of work in English.

13. THE BIBLE AS LITERATURE — MRS. POTTER

Three credits (three hours per week) — Second semester

Open to juniors and seniors.

14. MILTON — MRS. POTTER

Three credits (three hours per week) — First semester

Open to juniors who have completed one year of work in English, preferably courses 6 and 7.

15. SHAKESPERE — MRS. POTTER

Three credits (three hours per week) — Second semester

Open to juniors who have completed one year and a half in English, preferably courses 6, 7 and 14.

16. **CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA** — **MISS PECK**
Six credits (three hours per week) — Both semesters
Open to seniors who have completed two years in English, including course 15.

18. **TEACHERS' COURSE IN ENGLISH** — **MRS. POTTER**
Two credits (two hours per week) — Both semester
Open to seniors who have completed courses 6, 7, 14, and 15; both semesters must be completed before credit is allowed for the first semester.

19. **HISTORY OF LITERARY CRITICISM** — **MR. BURTON**
Two credits (two hours per week) — Both semesters
Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.

20. **ENGLISH PROSE** — **MR. BURTON**
Three credits (three hours per week) — First semester
Open to juniors and seniors who have completed one year of English.

21. **BROWNING AND TENNYSON** — **MR. BURTON**
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed one year of English.

22. **HISTORY OF THE ENGLISH LANGUAGE** — **MR. KLAEBER**
One credit (one hour per week) — Second semester
Open to sophomores, juniors, and seniors who have completed the first semester of course 3; required of all who take their major or obtain a teacher's recommendation in English.

FOR A MAJOR, courses 3 (first semester), 6, 7, 14, 15, 18, and 22, together with six additional credits in English and course 2 in rhetoric, are required.

FOR A MINOR, eighteen credits, not counting courses 1 and 2, and including course 19 or course 22, the courses to be selected after consultation.

Students may select additional work, on the approval of the head of the department, from other courses announced in English.

GEOLOGY AND MINERALOGY

CHRISTOPHER W. HALL, Professor, Head of the Department of Geology and Mineralogy
EDWARD M. LEHNERTS, Assistant Professor
FREDERIC W. SARDESON, Assistant Professor

1. **GENERAL GEOLOGY** — **MR. HALL**
Three credits (three hours per week) — First semester
Open to juniors and seniors.
This course comprises: (1) geodynamics, (2) structural geology, (3) physiographic geology, (4) an outline of historical geology. Lectures and conferences, illustrated by photographs, maps, profiles, and lantern slides.

2. **ESSENTIALS OF PHYSICAL GEOGRAPHY** — **MR. LEHNERTS**
Three credits (three hours per week) — First semester
Open to juniors and seniors.
A discussion of earth sculpture and description of the structural features of

continents, with special reference to the ethnic movements and commercial activities of mankind.

3. INDUSTRIAL GEOGRAPHY — MR. LEHNERTS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1 or course 2.

The structural features of the North American continent outlined as an introduction; following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past hundred years, and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports; a brief survey of industries in other parts of the world parallels the more detailed study of North America; throughout the course cause and effect are kept in view.

4. ELEMENTS OF METEOROLOGY — MR. LEHNERTS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1 or course 2.

The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally; the conditions of climatic changes are studied and the influence of physiographic conditions is discussed. Text-book, lectures, and reference reading.

5. GEOGRAPHY AND GEOLOGY OF MINNESOTA — MR. HALL

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1.

(a) The physical geography of the state in its relations to geological history and industrial development; (b) a study of the principles and facts of pre-Cambrian geology as exemplified within the state, and the extension of these into general application; (c) the present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

6. HISTORICAL GEOLOGY — MR. SARDESON

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1, course 7, or course 8.

A course in historical geology, including a study of the more important types of fossils in their geological relations; the history of the North American continent in particular is considered; lectures and demonstrations.

15. THE METHOD AND MATERIAL OF GEOGRAPHY — MR. LEHNERTS

Two credits (one hour per week) — Both semesters

Open to juniors and senors; designed especially for teachers.

The earth as an object of study in the grades and in the high school; the guiding principles; the course of study; text-books and their use; practical laboratory work; excursions; collection and preparation of illustrative material; map drawing; chalk modeling; relief work; organization of geographical subject matter for class room instruction; and the method of recitation.

Students will not offer a major in geology and mineralogy toward graduation in this college except by special permission, but all who intend to teach any biological or physical science are advised to take at least some of the elementary courses, to be selected after consultation.

GERMAN

John G. Moore, Professor, Head of the Department of German
Carl Schlenker, Professor
Oscar Burkhard, Assistant Professor
Matilda J. Wilkin, Assistant Profess r

Courses 1, 2 or 3, and 5 are introductory courses. Students who present German for entrance may select courses 4 and 6 or 7 during the first two college years.

8. Advanced Conversation, Grammer and Composition
Mr. Schlenker, Mrs. Wilkin, and Mr. Burkhard
Four credits (two hours per week) Both semesters
Open to those who have taken or are taking course 6, course 7, or course 9; recommended that it be preceded by course 5; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

9. German Literature of the Classic Period Mr. Moore
Six credits (three hours per week) Both semesters
Open to those who have completed courses 1 and 2 (by special permission), or 3 and 7, or 4 and 6; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

10. Modern Authors, German Literature of the Nineteenth Century
Mr. Moore
Six credits (three hours per week) Both semesters
Open to those who have completed courses 1, 2 and 9 (by special permission), or 4, 6, and 9, or 3, 7, and 9; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

11. Teachers' Course Mr. Moore
One credit (one hour per week) Second semester
Open to those who have completed course 10; this course is especially designed for those who expect to become teachers of German in high schools.

For a Major, course 2 or course 4, course 6 or course 7, and courses 8, 9, 10, and 11 are required, with an average of at least good.

For a Minor, eighteen credits, not including course 1, to be selected after consultation.

Students may select additional work, on the approval of the head of the department, from other courses annouced in German.

GREEK

John Corrin Hutchinson, Professor, Head of the Department of Greeke
Charles Albert Savage, Professor

In addition to at least two of the preliminary courses, students who expect to teach Greek in the high schools should take the following:

4. **ORATORY**: Lysias and Demosthenes — **MR. SAVAGE**
Three credits (three hours per week) — **First semester**
Open to those who have completed course 2 or course 3.

The course consists chiefly of readings from the orations of Lysias and Demosthenes; selections from Socrates may also be read. This work is supplemented by lectures on Greek oratory, and some attention is given to the study of Greek rhetoric. At this stage of the student's development less attention is given to syntax, and more attention is paid to matters of literary interest.

5. **PHILOSOPHY**: Plato's *Apology*, Xenophon's *Memorabilia* — **MR. SAVAGE**
Three credits (three hours per week) — **Second semester**
Open to those who have completed course 2 or course 3.

The course consists chiefly in the reading of Plato's *Apology* together with selections from Xenophon's *Memorabilia*. The reading of texts is supplemented by lectures on Greek philosophy.

6. **LYRICS** — **MR. BROOKS**
Three credits (three hours per week) — **First semester**
Open to juniors and seniors who have completed course 4 or course 5.

7. **TRAGEDY**: Aeschylus and Sophocles — **MR. BROOKS**
Three credits (three hours per week) — **Second semester**
Open to juniors and seniors who have completed course 5.

8. **PHILOSOPHY** (advanced): Plato's *Republic* — **MR. HUTCHINSON**
Three credits (three hours per week) — **First semester**
Open to juniors and seniors who have completed course 5; alternates with course 9; not offered in 1909–10.

The Republic of Plato is read, not primarily for its philosophic interest, but as one of the best masterpieces of Greek literature. The study is, therefore, in the main, a study of literary style.

9. **ORATORY** (advanced): Demosthenes' *De Corona* — **MR. HUTCHINSON**
Three credits (three hours per week) — **First semester**
Open to juniors and seniors who have completed course 4.

This course is intended to secure a careful study of the development of oratorical style among the Greeks, and its culmination in this acknowledged masterpiece

10. **EPIC POETRY** (advanced): The Odyssey — **MR. HUTCHINSON**
Three credits (three hours per week) — **Second semester**
Open to juniors and seniors who have completed course 7.

The object of this course is to secure as intimate an acquaintance as possible, at first hand, with Homer. The Homeric question is given but scanty attention; its place is in the graduate work (course 19). Literary values receive chief attention, and that these may be realized by the student, as much of the text is read as is consistent with careful work.

13. **GREEK COMPOSITION** — **MR. HUTCHINSON**
Two credits (one hour per week) — **Both semesters**
Open to juniors and seniors who have completed courses 4 and 5; both semesters must be completed before credit is given for the first semester; recommended to those who expect to teach Greek.

FOR A MAJOR, courses 4, 5, 7, 10, and 14 are required.

FOR A MINOR, at least eighteen credits.

Students who desire further courses in Greek will consult with the head of the department.

HISTORY

WILLIS M. WEST, Professor, Head of the Department of History
FRANK M. ANDERSON, Professor
ALBERT B. WHITE, Professor
WILLIAM STEARNS DAVIS, Professor
WALLACE NOTESTEIN, Instructor

INTRODUCTORY COURSES

1. EUROPEAN HISTORY FROM THE ESTABLISHMENT OF THE ROMAN EMPIRE TO THE REFORMATION, 31 B. C. TO 1500 A. D. MR. DAVIS
Six credits (three hours per week) Both semesters
Open to all; juniors and seniors receive only half credit.

Especially designed for freshmen who have had less than two years of history in the secondary schools; not credited toward a minor in history.

2. ENGLISH CONSTITUTIONAL HISTORY TO THE ACCESSION OF GEORGE I. MR. WHITE AND MR. NOTESTEIN
Six credits (three hours per week) Both semesters
Open to all who have had two years of history in the secondary schools, or who have completed course 1.

GENERAL COURSES

3. THE RENAISSANCE AND REFORMATION MR. WHITE
Three credits(three hours per week) First semester
Open to those who have completed course 1 or course 2.

The Renaissance and the Reformation will be studied as general European movements, with emphasis upon the work of individual men and upon ideas rather rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. EUROPE SINCE 1789 MR. ANDERSON
Six credits (three hours per week) Both semesters
Open to those who have completed course 1 or course 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it as far as possible.

5. AMERICAN CONSTITUTIONAL HISTORY TO 1840 MR. WEST
Six credits (three hours per week) Both semesters
Open to those who have completed course 2.

Required for courses 6 to 9, inclusive, 11, 13, 14, and 19, and therefore recommended for the sophomore year to students who expect to specialize in history.

6. AMERICAN CONSTITUTIONAL HISTORY, 1841–1885 MR. ANDERSON
Three credits (three hours per week) First semester
Open to those who have completed course 2 and at least the first semester of course 5; given in 1908–9 and in alternate years thereafter.

15. HISTORICAL METHOD AND BIBLIOGRAPHY MR. WHITE
Two credits (two hours per week) Second semester
Open to those who have completed course 1 or course 2; designed only for those who intend to specialize in history.

16. TEACHERS' COURSE — MR. WEST

One credit (one hour per week) — Second semester

Open to seniors and graduates who have, including courses in progress, twenty-four credits in history; required of those who obtain a teacher's recommendation in history.

This course is designed to assist those who expect to teach history in the high schools. Mr. West will be aided by other members of the department.

20. ENGLAND SINCE 1815 — MR. ANDERSON

Three credits (three hours per week) — Second semester

Open to those who have completed course 2; may be taken to advantage in connection with course 4; not given in 1908–9.

21. HISTORY OF GREECE — MR. DAVIS

Three credits (three hours per week) — First semester

Open to those who have completed course 1 or course 2.

The course is general in its nature, and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire, with particular emphasis upon the latter part of the period. Special attention will be given to the permanent influence of Greek civilization.

INTENSIVE COURSES.

7. THE MAKING OF THE CONSTITUTION — MR. WEST

Six credits (three hours per week) — Both semesters

Open to juniors, seniors, and graduates who have completed course 5, but only on the approval of the instructor; both semesters must be completed before credit is given for the first semester.

8. AMERICAN HISTORY SINCE 1789, AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW — MR. WEST

Three credits (three hours per week) — First semester

Open to seniors and graduate students who have completed courses 2, 5, 6, and 7; not given in 1909-10.

9. STUDIES IN AMERICAN STATESMEN — MR. ANDERSON

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed course 2, and at least the first semester of course 5.

10. A CRITICAL STUDY OF A HISTORICAL MASTERPIECE — MR. ANDERSON

Three credits (three hours per week) — First semester

Open to those who have completed course 5.

11. THE HISTORY OF AMERICAN DIPLOMACY — MR. ANDERSON

Three credits (three hours per week) — First semester

Open to seniors and graduates who have completed course 5.

12. THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789 — MR. ANDERSON

Three credits (three hours per week) — First semester

Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

13. COLONIAL EXPANSION AND ADMINISTRATION — MR. WEST

Three credits (three hours per week) — Second semester

Open to seniors and graduates who have completed course 4 or course 5; given in alternate years; not given in 1909-10.

14. A CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY — MR. WEST

Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed eighteen credits, including course 5; both semesters must be completed before credit is given for the first semester; given in alternate years.

17. BEGINNINGS OF PARLIAMENT — MR. WHITE

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed twelve credits, including course 2. Students should have a reading knowledge of Latin. Latin 9 gives good preparation for this period. This course alternates with course 18; not given in 1909-10.

18. ORIGIN OF THE ENGLISH JUDICIAL SYSTEM — MR. WHITE

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed six credits in history, including course 2, and who obtain permission of the instructor. Students should be able to read Latin, and Latin 9 is recommended to give this preparation. This course alternates with course 17; given in 1909-10.

19. ENGLISH INSTITUTIONAL DEVELOPMENT IN THE SEVENTEENTH CENTURY — MR. NOTESTEIN

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed twelve credits in history, including course 2.

22. GREEK POLITICAL INSTITUTIONS — MR. DAVIS

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed courses 1 or 2, 21, and six additional credits.

23. ROMAN IMPERIAL ORGANIZATION — MR. DAVIS

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduates who have completed twelve credits.

FOR A MAJOR, twenty-four credits, including course 4 or course 5, course 16, and at least six credits in intensive courses, are required. At least the elements of the other social sciences are recommended.

FOR A MINOR, eighteen credits.

Students who expect to teach history are advised to consult in respect to their courses with the head of the department during the freshman year.

LATIN

JOSEPH B. PIKE, Professor, Head of the Department of Latin
JOHN S. CLARK, Professor

Students who desire a recommendation to teach Latin are expected to take courses 1, 2, 3, and 4 during the first two college years.

5. OVID — MR. CLARK

Two credits (one hour per week) — Both semesters

Open to those who have taken courses 1 and 2; both semesters must be completed before credit is given for the first semester.

Translations from Ovid's *Fasti* with a study of the religion and religious ceremonials of the Romans.

6. ADVANCED COURSE IN CAESAR — MR. PIKE

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 to 4, inclusive; required for teacher's recommendation in Latin.

Selections from books five to seven of the Gallic War and from the Civil War: thorough study of the principles of indirect discourse; intermediate composition; approximately one hour for one half semester will be spent upon technical portions of the work, e. g. class drill work and discussion of the various problems connected with secondary school work in Latin.

7. ADVANCED COURSE IN VIRGIL — MR. PIKE

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.

An interpretation of selections from books seven to twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages; approximately one hour for one half semester will be spent upon the strictly technical portions of the subject.

10. LATIN COMPOSITION — MR. PIKE

Two credits (two hours per week) — Second semester

Open to those who have completed courses 1 to 4, inclusive. Required for degree with distinction.

12. CORRESPONDENCE OF CICERO — MR. CLARK

Two credits (two hours per week) — First semester

Open to those who have completed courses 1 to 4, inclusive.

Selections from the letters of Cicero, with a study of the life and history of his times.

FOR A MAJOR, courses 1, 2, 3, 4, 5, 6, and 7, with an average of at least good, are required.

FOR A MINOR, courses 1, 2, 3, and 4.

Students may select additional work, on the approval of the head of the department, from other courses announced in Latin.

MANUAL TRAINING

J. J. FLATHER, Professor and Head of the Department of Mechanical Engineering
W. H. RICHARDS, Instructor
S. C. SHIPLEY, Instructor

Each credit hour calls in all manual training courses for at least three hours of shopwork.

1. INTRODUCTORY COURSE IN WOODWORK — MR. RICHARDS
Three credits — First semester
Open to juniors or seniors.

Planned to give the elementary principles of sloyd and familiarity with material and tools.

2. ADVANCED COURSE IN WOODWORK — MR. RICHARDS
Three credits — Second semester
Open to juniors and seniors.

3. INTRODUCTORY COURSE IN IRONWORK — MR. SHIPLEY
Three credits — First semester
Open to juniors and seniors.

4. ADVANCED COURSE IN IRONWORK — MR. SHIPLEY
Three credits — Second semester
Open to juniors and seniors.

Students may register for credit in manual training courses only with the approval of the committee.

MATHEMATICS

JOHN F. DOWNEY, Professor, Head of the Department of Mathematics
GEORGE N. BAUER, Professor
WILLIAM H. BUSSEY, Assistant Professor
ANTHONY L. UNDERHILL, Assistant Professor
GEORGE P. PAINE, Assistant Professor
ROYAL R. SHUMWAY, Instructor
JAMES S. MIKESH, Instructor

1. HIGHER ALGEBRA, PART I — MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE, AND MIKESH
Five credits (five hours per week) — First semester

2. ALGEBRA CONTINUED AND PLANE TRIGONOMETRY — MESSRS. BAUER, BUSSEY, UNDERHILL, PAINE, AND MIKESH
Five credits (five hours per week) — Second semester

3. HIGHER ALGEBRA, PART II — MESSRS. BAUER, BUSSEY, UNDERHILL, AND PAINE
Three credits (three hours per week) — First semester

4. TRIGONOMETRY — MESSRS. BUSSEY AND PAINE
Three credits (three hours per week) — Second semester

5. HIGHER ALGEBRA, PARTS II AND III AND TRIGONOMETRY — MESSRS. BUSSEY, PAINE, AND MIKESH
Ten credits (five hours per week) — Both semesters

6. HIGHER ALGEBRA, PART III. — MESSRS. BUSSEY AND PAINE
Three credits (three hours per week) — First semester
Open to those who have completed course 2, course 4, or course 5.

7. **Analytical Geometry** — Messrs. Bussey, Underhill, and Paine
Three credits (three hours per week) — First semester
Open to those who have completed course 6

8. **Differential Calculus** — Messrs. Downey and Underhill
Three credits (three hours per week) — First semester
Open to those who have completed course 7.

9. **Integral Calculus** — Messrs. Downey and Underhill
Three credits (three hours per week) Second semester (first semester in 1909-10).
Open to those who have completed course 8.

13. **Mathematical Pedagogy** — Mr. Bauer
One credit (one hour per week) — Second semester
Open to those who have completed course 7.

A lecture course, in which special attention is paid to the fundamental principles of algebra and geometry.

For a Major, eighteen credits, with an average of at least good, are required, including courses 6, 7, 8, 9, and 13, but not including courses 1 and 2.

For a Minor, twelve credits, not including courses 1 and 2.

MUSIC

Carlyle M. Scott, Professor, Head of the Department of Music
Laura Francis Kendall, Instructor

1. **Harmony** — Mr. Scott
Four credits (two hours per week) — Both semesters
Open to juniors and seniors; the fee is four dollars per semester.

2. **Counterpoint** — Mr. Scott
Four credits (two hours per week) — Both semesters
Open to juniors and seniors who have a thorough knowledge of harmony; the fee is four dollars per semester.

3. **Musical Form and Free Composition** — Mr. Scott
Two credits (two hours per week) — Second semester
Open to seniors who have completed course 1 and the first semester of course 2.

Intended for those specializing in music, and can be taken only with the consent of the instructor; the fee is four dollars per semester.

4. **Pianoforte** — Mr. Scott
Three or six credits (one and one-half or three hours per week) Both semesters
Open to juniors and seniors.

Intended for those who propose to pursue the higher branches of pianoforte playing, or to fit themselves for piano teaching.

5. **Pianoforte**, Second course — Mr. Scott
Three or six credits (one and one-half or three hours per week) Both semesters
Open to seniors who have completed course 4. The fee is thirty-two or sixty-four dollars per semester.

6. **CHORAL CULTURE** — MR. SCOTT

Two credits (one hour per week) — Both semesters

Open to juniors and seniors

A single credit may be secured for chorus work, provided that students pursuing work for credit take course 1 or 2 at the same time; students may pursue chorus work without credit by paying the required fee and securing the consent of the director.

7. **PUBLIC SCHOOL MUSIC** — MRS. KENDALL

Two credits (two hours per week) — Each semester

Open to juniors and seniors.

This course includes methods, harmony, analysis, voice training, composition, and practice teaching. Students are expected to become members of the chapel choir and take part in its duties.

8. **HISTORY OF MUSIC** — MR. SCOTT

Two credits (one hour per week.) — Both semesters

Open to juniors and seniors; the fee is four dollars per semester.

PHILOSOPHY AND PSYCHOLOGY

NORMAN WILDE, Professor, Head of the Department of Philosophy and Psychology
JOHN B. JOHNSTON, Associate Professor
DAVID F. SWENSON, Assistant Professor
JAMES B. MINER, Assistant Professor
ROWLAND HAYNES, Assistant Professor

1. **INTRODUCTORY PSYCHOLOGY** — MESSRS. MINER, SWENSON, AND HAYNES

Three credits (three hours per week) — Each semester

Open to sophomores, juniors, and seniors.

Required for all advanced work in psychology and for the teacher's certificate: it also serves as an introduction to the courses in philosophy. Students who expect to teach are advised to take this course during the second college year.

2. **LOGIC** — MESSRS. WILDE, SWENSON AND HAYNES

Three credits (three hours per week) — Each semester

Open to sophomores, juniors, and seniors.

3. **EDUCATIONAL PSYCHOLOGY** — MESSRS. MINER AND HAYNES

Three credits (three hours per week) — Each semester

Open to those who have completed course 1.

This course is commended to those who expect to teach; it is announced also as course 8 in education, and is accepted toward the requirements of the teacher's certificate, and counts as one of the five courses in education required for graduation in this college.

4. **EXPERIMENTAL PSYCHOLOGY: The Senses.** — MESSRS. MINER AND HAYNES

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed course 1. As the number in each laboratory section will be limited, students must arrange with their instructors as to their section before registration.

5. **Experimental Psychology—Higher Mental Processes** — **Mr. Miner**
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1 and 4.

6. **Outline of Experimental Psychology** — **Mr. Miner**
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 1; not given in 1909–10.

All of the above courses have direct bearing upon the problems of education. The attention of future teachers is directed also to courses in ethics, the history of philosophy, the philosophy of religion, and other courses which are announced in the bulletin of the College of Science, Literature, and the Arts.

The following course in neurology, offered by the College of Medicine and Surgery, is of value to students who are taking advanced courses in psychology, and who are preparing to specialize in the teaching of education and psychology.

26. **The Nervous System and Mental Life** — **Mr. Johnston**
Three credits (three hours per week) — Second semester
Open to juniors and seniors

PHYSICS

John Zeleny, Professor, Head of the Department of Physics
Anthony Zeleny, Professor
Henry A. Erikson, Assistant Professor
Alois F. Kovarik, Instructor

1. **General Physics** — **Mr. John Zeleny**
Three credits (three hours per week) — First semester
Open to sophomores, juniors, and seniors who have completed mathematics 4 or 2 (Trigonometry); may be taken separately or in conjunction with course 2.

Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics; the treatment is experimental rather than mathematical; the course is designed to give the students a general knowledge of the fundamental principles of the subject, and will be found especially useful to those pursuing other sciences. There will be one experimental lecture and two recitations each week.

2. **General Laboratory Practice** — **Mr. Kovarik**
One credit (two hours per week) — First semester
Open to sophomores, juniors, and seniors who have completed or are taking course 1; the laboratory fee is three dollars.

Physical measurements in the mechanics of solids and in heat and sound, giving the student a knowledge of experimental methods.

3. **General Physics** — **Mr. John Zeleny**
Three credits (three hours per week) — Second semester
Open to sophomores, juinors, and seniors who have completed course 1; may be taken separately or in conjunction with course 4.

Light, electricity and magnetism. This is the second part of a general course in physics; the treatment is experimental, and the fundamental principles of the subject, including those of radioactivity, ionization and radiation, and the electrical constitution of matter are discussed and illustrated. There will be one experimental lecture and two recitations each week.

4. **General Laboratory Practice** — Mr. Kovarik
One credit (two hours per week) — Second semester

Open to sophomores, juniors, and seniors who have completed or are taking course 3; the laboratory fee is three dollars.

Physical measurements in light, electricity, and magnetism, giving the students a knowledge of experimental methods.

5. **Mechanics of Solids and Fluids** — Messrs. J. Zeleny, A. Zeleny, Erikson, and Kovarik
Four credits (three recitations, one lecture, or two hours laboratory)
First semester

Open to sophomores, juniors, and seniors who have completed mathematics 4 or 2 (trigonometry); the laboratory fee is two dollars.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.

6. **Heat, Magnetism, and Electrostatics** — Mr. J. Zeleny, A. Zeleny, Erikson and Kovarik
Four credits (one lecture, two recitations, and two hours laboratory per week)
Second semester

Open to those who have completed course 5; the laboratory fee is three dollars.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. **Electrokinetics** — Messrs. J. Zeleny, A. Zeleny, Erikson and Kovarik
Four credits (one lecture, two recitations, and two hours laboratory per week)
First semester

Open to those who have completed course 6; the laboratory fee is three dollars.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids, and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radio-activity, electric waves, and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. **Sound and Light** — Messrs. J. Zeleny, Erikson, and Kovarik
Four credits (one lecture, two recitations, and two hours laboratory per week)
Second semester

Open to those who have completed course 5; the laboratory fee is three dollars.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

22. **Teachers' Course** — Mr. Zeleny
One credit (one hour per week) — Second semester

Open to seniors who have completed courses 1 to 4, inclusive, or courses 5 and 6.

No special matter is discussed, but methods of presentation and the selection of lecture material and laboratory experiments are considered; the work is conducted by the students under the supervision of the instructor.

For a Major, courses 5, 6, 7, 8, and 22 are required, together with six credits in chemistry.

RHETORIC AND PUBLIC SPEAKING

Joseph M. Thomas, Professor, Head of the Department of Rhetoric and Public Speaking
Ada L. Comstock, Professor
Frank M. Rarig, Assistant Professor
Oscar W. Firkins, Assistant Professor
Haldor Gislason, Instructor
Anna H. Phelan, Instructor
Wilford O. Clure, Instructor
Nellie A. Whitney, Instructor

RHETORIC

1. Composition and Rhetoric — Messrs. Thomas, Firkins, and Clure, Misses Comstock, and Whitney, and Mrs. Phelan

Six credits (three hours per week) — Both semesters

Open to all, but juniors and seniors must obtain the consent of the head of the department, and will receive only half credit.

2. Advanced Composition and Rhetoric — Messrs. Thomas, Firkins, and Clure, Miss Whitney, and Mrs. Phelan

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors who have completed course 1 or English 1 and 2.

3. Advanced Rhetoric — Miss Comstock

Six credits (three hours per week) — Both semesters

Open to juniors and seniors who have completed courses 1 and 2. This course should be taken by all who expect to teach English in the secondary schools.

4. Argumentative Writing — Mr. Thomas

Three credits (three hours per week) — First semester

Open those who have completed courses 1 and 2.

5. Short Story Writing — Mr. Thomas

Three credits (three hours per week) — Both semesters

Open to those who have shown exceptional proficiency in course 2.

6. Seminar — Mr. Thomas

Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1 and 2 and at least one other course.

This course is intended for those who are specializing in rhetoric and composition. In 1909-10 the course will be devoted to lectures, reports, and theses on the history of rhetorical theory.

10. A GENERAL COURSE IN PUBLIC SPEAKING — MESSRS. RARIG AND GISLASON
Six credits (three hours per week) — Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2.

11. INTERPRETATIVE READING — MR. RARIG
Six credits (three hours per week) — Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.

This course aims to develop intelligent, suggestive, and sympathetic reading. The text used is Shakespere's plays.

12. ARGUMENTATION AND DEBATE — MR. GISLASON
Six credits (three hours per week. — Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.

14. ORATORICAL COMPOSITION — MR. RARIG
Six credits (three hours per week) — Both semesters
Open to those who have completed rhetoric 1 or English 1 and 2, and rhetoric 10.

ROMANCE LANGUAGES

CHARLES W. BENTON, Professor, Head of the Department of Romance Languages
CHARLES M. ANDRIST, Professor
JULIUS T. FRELIN, Assistant Professor
EMMA BERTIN, Instructor

1. BEGINNING FRENCH — MESSRS. ANDRIST AND FRELIN, AND MADAME BERTIN
Ten credits (five hours per week) — Both semesters
Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not counted toward a minor in French.

2. INTERMEDIATE FRENCH — MESSRS. ANDRIST AND FRELIN, AND MADAME BERTIN
Six credits (three hours per week) — Both semesters
Open to sophomores, juniors, and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.

3. ADVANCED FRENCH GRAMMAR AND COMPOSITION — MESSRS. ANDRIST AND FRELIN
Six credits (three hours per week) — Both semesters
Open to all who enter the university with two years of French; both semesters must be completed before credit is given for the first semester.

4. BEGINNING FRENCH CONVERSATION — MESSRS. ANDRIST AND FRELIN AND MADAME BERTIN
Four credits (two hours per week) — Both semesters
Open only to those who have completed or are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.

5. **The Classical Period of French Literature** — Mr. Benton
Six credits (three hours per week) — Both semesters

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

6. **Advanced French Conversation** — Mr. Benton
Four credits (two hours per week) — Both semesters

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

7. **French Literature of the Nineteenth Century** — Mr. Benton
Six credits (three hours per week) — Both semesters

Open to those who have completed course 2 or course 3 and course 5; both semesters must be completed before credit is given for the first semester

8. **Teachers' Course in French** — Mr. Benton
Two credits (one hour per week) — Both semesters

Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

For a Major, an average of at least good in courses 2 or 3 and 4, 5, 6, 7, and 8 is required.

For a Minor, eighteen credits, including course 2 or course 3 and course 5.

SOCIOLOGY AND ANTHROPOLOGY

Samuel G. Smith, Professor, Head of the Department of Sociology and Anthropology
Albert E. Jenks, Professor
Samuel N. Reep, Assistant Professor

1. **Descriptive Sociology** — Mr. Jenks
Three credits (three hours per week) — First semester

Open to juniors and seniors.

This is a preliminary course designed as the first work of students in the department. It presents concrete data concerning human association, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment, and it discovers the activities and institutions natural and peculiar to the several groups studied. Text-book, lectures, assigned readings, and thesis.

2. **Elements of Sociology** — Mr. Reep
Three credits (three hours per week) — Each semester

Open to juniors and seniors.

This course is designed to give general knowledge of the field of modern sociology, the attempt being to prepare students for such special sociological investigations as they may wish to make. Text-book, lectures, assigned readings, and thesis.

3. **Social Pathology** — Mr. Smith
Three credits (three hours per week) — First semester

Open to juniors and seniors.

This course covers the field of charities and corrections, dealing especially with problems of poverty, crime, insanity, and social degeneration. It also presents a discussion of the child problem and methods of social amelioration.

4. **SOCIAL THEORY** — MR. REEP

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduate students.

This course includes a study of the leading American, English, French, and German writers to discover their methods of approach to the science, and the leading results they have secured.

5. **SOCIAL GROUPS** — MR. REEP

Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduate students.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. **THE STUDY OF INSTITUTIONS** — MR. SMITH

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

The genesis of custom and the beginnings of law, with the geographical influence in the growth of states, will be studied, as well as the various forms of the family and their relation to forms of civilization.

7. **ANTHROPOLOGY** — MR. JENKS

Three credits (three hours per week) — First semester

Open to juniors and seniors.

This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It primarily investigates the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text-books, lectures, assigned readings, and thesis.

8. **ETHNOLOGY** — MR. JENKS

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1, course 2, or course 7, and to graduate students,.

This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the cause of the origin and distribution of several races and sub-races are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Text-books, lectures, assigned readings, and thesis.

M

THE GRADUATE SCHOOL

The Graduate School

FACULTY

Cyrus Northrop, LL. D., President 519 Tenth Avenue S. E.

Henry T. Eddy, C. E., Ph. D., LL. D. 916 Sixth Street S. E.
Dean of the Graduate School, and Professor of Mathematics and Mechanics, College of Engineering and the Mechanic Arts.

Cephas D. Allin, M. A., LL. B., Minneapolis
Instructor in Political Science.

Frank Maloy Anderson, M.A., 1629 University Avenue S. E.
Professor of History.

Charles W. Benton, M.A., Litt.D., 516 Ninth Avenue S. E.
Professor of the French Language and Literature.

Andrew Boss, St. Anthony Park
Professor of Agriculture and Animal Husbandry.

Gisle Bothne, M.A., 934 Fifteenth Avenue S. E.
Associate Professor of Scandinavian Languages and Literature.

Jabez Brooks, D.D., 1708 Laurel Avenue
Senior Professor of the Greek Language and Literature.

Richard Burton, Ph.D., 2109 Blaisdell Ave.
Professor of English Literature.

William H. Bussey, Ph.D., Minneapolis
Assistant Professor of Mathematics.

John S. Clark, B.A., 729 Tenth Avenue S. E.
Professor of the Latin Language and Literature.

F. R. Clements, Ph.D., Minneapolis
Professor of Botany.

Frank H. Constant, C.E., 1803 University Avenue S. E.
Professor of Structural Engineering.

John L. Coulter, M.A., Minneapolis
Instructor in Economics.

W. S. Davis, Ph.D., Minneapolis
Professor of Ancient History.

Samuel N. Deinard, M.A., Minneapolis
Assistant Professor of the Semitic Languages and Literatures.

John F. Downey, M.A., C.E., 825 Fifth Street E. E.
Dean of the College of Science, Literature and the Arts,
and Professor of Mathematics.

Henry A. Erickson, Ph.D., Minneapolis
Assistant Professor of Physics.

Oscar W. Firkins, M.A., 1528 4th Street S. E.
Instructor in Rhetoric.

John J. Flather, Ph.B., M.M.E., 315 Eleventh Ave. S. E.
Professor of Mechanical Engineering.

George B. Frankforter, M.A., Ph.D., 525 River Road, S. E.
Dean of the School of Chemistry, and Professor of Chemistry.

Edward M. Freeman, M.S., Ph.D., St. Anthony Park
Assistant Professor of Botany.

John E. Granrud, Ph.D., 605 Delaware Street S. E.
Professor of Latin.

J. H. Gray, Ph.D., 412 Walnut Street S. E.
Professor of Economics and Politics.

Samuel B. Green, B.S., St. Anthony Park
Professor of Horticulture and Forestry, and Horticulturist
of the Experiment Station.

T. L. Haecker, St. Anthony Park
Professor of Dairy Husbandry.

Christopher W. Hall, M.A., 803 University Avenue S. E.
Professor of Geology and Mineralogy; Curator of the
Geological Museum.

Arthur Edwin Haynes, M.S., M.Ph., Sc.D., 703 River Parkway
Professor of Engineering Mathematics.

John C. Hutchinson, B.A., 3806 Blaisdell Avenue
Professor of the Greek Language and Literature.

George Francis James, Ph.D., 316 Tenth Avenue S. E.
Dean of the College of Education, and Professor of Education.

Albert Ernest Jenks, Ph.D., 313 Sixteenth Avenue S. E.
Professor of Anthropology.

John Black Johnston, Ph.D., 509 St. Anthony Parkway
Assistant Professor of the Anatomy of the Nervous System.

William H. Kavanaugh, M.E., 118 State St. S. E.
Professor of Experimental Engineering.

William H. Kirchner, B.S., 217 Beacon Street
Professor of Drawing and Descriptive Geometry.

Frederick Klaeber, Ph.D., 616 Ninth Avenue S. E.
Professor of Comparative and English Philology.

Francis P. Leavenworth, M.A., 317 Seventeenth Ave. S. E.
Professor of Astronomy and Director of the Observatory.

Thomas G. Lee, B.S., M.D., 509 River Road
Professor of Anatomy.

James Burt Miner, Ph.D., 428 Walnut Street S. E.
Assistant Professor of Psychology.

John G. Moore, B.A., 2810 University Avenue S. E.
Professor of the German Language and Literature.

W. S. Nickerson, Sc.D., M.D., 217 Beacon Street S. E.
Assistant Professor of Histology and Embryology.

Henry F. Nachtrieb, B.S., 905 Sixth Street S. E.
Professor of Animal Biology; Zoologist of the Geological and Natural History Survey; Curator of the Zoological Museum.

Oscar W. Oestlund, M.A., 1910 Fourth Street S. E.
Assistant Professor of Animal Biology.

William S. Pattee, LL.D., 1319 Fifth Street S. E.
Dean of the College of Law, and Professor of Equity and International Law.

Mary Gray Peck, M.A., 2412 Harriet Avenue
Assistant Professor of English.

Raymond V. Phelan, Ph.D., 1629 University Avenue S. E.
Instructor in Economics.

Joseph Brown Pike, M.A., 525 Tenth Avenue S. E.
Professor of Latin

Frances S. Potter, M.A., 2412 Harriet Avenue
Professor of English.

Benjamin M. Rastall, Ph.D., Minneapolis
Assistant Professor of Economics.

Albert W. Rankin, A.B., 916 Fifth Street S. E.
Professor of Education.

M. H. Reynolds, M.D., V.M., St. Anthony Park
Professor of Veterinary Medicine and Surgery and Veterinarian of the Experiment Station.

E. V. Robinson, Ph.D., 1213 Seventh Street S. E.
Professor of Economics and Politics.

C. O. Rosendahl, Ph.D., 626 Sixteenth Avenue S. E.
Assistant Professor of Botany.

Frederick W. Sardeson, Ph.D., 414 Harvard Street
Assistant Professor of Paleontology.

Charles Albert Savage, Ph.D., 454 Ashland, St. Paul.
Professor of Greek.

William A. Schaper, Ph.D., 625 Fulton Street.
Professor of Political Science.
Carl Schlenker, B.A., 422 Union Street S. E.
Professor of German.
George D. Shepardson, A.M., M.E., Minneapolis
Professor of Electrical Engineering.
Charles F. Sidener, B.S., 1320 Fifth Street S. E.
Professor of Chemistry.
Charles P. Sigerfoos, Ph.D., 328 Tenth Avenue S. E.
Professor of Zoology.
Samuel G. Smith, Ph.D., LL.D.. St. Paul
Professor of Sociology.
Harry Snyder, B.S., St. Anthony Park
Professor of Agricultural Chemistry, and Chemist of the Experiment Station.
Frank W. Springer, E.E., 1005 University Avenue S. E.
Professor of Electrical Engineering.
Andrew Adin Stomberg, M.A., 709 Delaware Street S. E.
Professor of Scandinavian Languages and Literature.
David F. Swenson, B.S., 3101 Sixteenth Avenue S.
Assistant Professor of Philosophy.
Joseph M. Thomas, M.A., Minneapolis
Professor of Rhetoric.
Josephine E. Tilden, M.S., 800 Fourth Street S. E.
Assistant Professor of Botany.
Anthony L. Underhill, Ph.D., Minneapolis
Assistant Professor of Mathematics.
Frederick L. Washburn, M.A., St. Anthony Park
Professor of Entomology, and Entomologist of the Experiment Station; State Entomologist.
Willis M. West, M.A., 1314 Sixth Street S. E.
Professor of History.
Frank F. Wesbrook, M.A., M.D., C.M., 328 Tenth Avenue S. E.
Dean of the College of Medicine and Surgery; Professor of Pathology and Bacteriology.
Albert B. White, Ph.D., 325 Sixth Avenue S. E.
Professor of History.
Norman Wilde, Ph.D., 910 Sixth Street S. E.
Professor of Philosophy and Psychology.
Frederick J. Wulling, Ph.G., Phar.D., LL.M., 3305 Second Avenue S.
Dean and Professor of Pharmacology, Pharmaceutical Chemistry, and Pharmacal Jurisprudence, College of Pharmacy.

Anthony Zeleny, Ph.D., 321 Church Street S. E
Professor of Physics.
John Zeleny, Ph.D., Minneapolis
Professor of Physics.

THE GRADUATE SCHOOL

The graduate school has been established by the Board of Regents to include in a single organization the graduate work of all colleges and schools of the University, which offer courses of instruction leading to the higher degrees. The administration of the school is entrusted to the Dean, who is charged with its supervision and regulation, under the general direction of the President.

The faculty of the school consists of all those professors in the University who give courses of instruction accepted for such higher degrees as are offered by the school. Each college of the University has its graduate committee.

The Dean is chairman of the faculty and of the graduate committees of the various colleges, ex officio.

Regular faculty meetings will be held on the second Friday of each semester and on the last Friday of they ear, and they may also be called by the Dean at such other times as business may demand.

The aim of the school is to offer instruction and opportunity for study combined with facilities for investigation and research to graduate students who desire to pursue some one or more branches of knowledge beyond the ordinary undergraduate courses.

FEES

All students taking full work in this school are required to pay a fee of ten dollars a semester, or a proportionate fee for less work. Members of the staff of instruction in the University may register for graduate work without payment of tuition fees. Laboratory fees are charged in addition to those just mentioned.

ADMISSION

Any graduate from a four years' course of study in any reputable college or university will be admitted to the graduate school without examination, but will not be thereby admitted to candidacy for either of the higher degrees until his case has been duly considered and approved, as is explained later, in connection with the several degrees.

Each applicant for admission to the school should present himself in person to the Registrar with his credentials (preferably his diploma of graduation), in order to register and pay his fees.

In case of doubt respecting the sufficiency of credentials, consult the Dean.

Registration at the beginning of each semester is obligatory upon graduate students and undergraduates alike.

Each student will receive at registration for entrance to the school a registration book in which to inscribe the courses he desires to pursue. When the instructors in charge of these courses shall have signed this book certifying that the student is prepared to begin such courses and when the Dean shall have approved his choice, the Registrar will issue cards authorizing the student to attend the courses thus certified to. Upon the successful completion of such work the instructors shall again sign the registration book. The student shall retain his book until ready for final examination, when he shall present it to the chairman of the examining committee. The action of the committee shall be recorded thereon and the book be deposited with the Registrar for record.

DEGREES

The degree of Master of Arts is, in general, conferred for advanced non-technical study; the degree of Master of Science for advanced technical study, such as agriculture, industrial chemistry, engineering, etc.; and Master of Laws for advanced legal studies.

THE MASTER'S DEGREE. Three degrees of this grade are conferred, viz.: Master of Arts (M.A.), Master of Science (M.S.), and Master of Laws (LL.M.).

CANDIDACY FOR THE MASTER'S DEGREE. Any bachelor, a graduate of this University or of any other university or college with an equivalent baccalaureate course, will be enrolled by the Dean as a candidate for the corresponding master's degree on the basis of an approved course of study conforming to requirements detailed below, provided the heads of the departments in which the studies selected lie, signify their approval of the student's preparation to enter upon the work selected.

In case of inadquate preparation for the work selected, such preliminary study as the case may require will be stated by the professor in charge and will be insisted on before the applicant is admitted to candidacy.

REGULATIONS. The master's degree will be conferred on any candidate enrolled for that degree, who not sooner than one year after graduation if in residence at the University, and not sooner than two years after registration if not in residence, shall pass satisfactory final examinations on the course which was approved when he was admitted to the candidacy, and shall in addition present an acceptable thesis in accordance with the following provisions:

The professor with whom the candidate pursues his major subject shall be chairman of a committee of three, having in charge the work of the candidate from the time of his enrollment as such, the other members of the committee being those professors under whom the candidate's minors fall. This committee shall arrange for and have charge of the final examinations of the candidate; they shall approve the subject of the thesis, and pass upon the thesis itself. The candidate must secure their approval of his subject at least three months before graduation, and must complete the thesis and all examinations at least two weeks before graduation. All candidates for the master's degree shall pass written examinations upon all work taken by them, time and place to be determined by the committee. If these examinations and the thesis are satisfactory, the candidates shall be admitted to a final oral examination before the committee. It shall be the duty of this committee to canvass the examinations of the candidate's whole course together with the thesis, and in case they regard him entitled to a degree, to report the fact to the Dean, at least one week before commencement. The chairman of the committee shall also make a final report upon the candidate to the Registrar one week before commencement.

Any candidate for master's degree at commencement must, as a preliminary, make application to the Dean in writing, by the first of the preceding May, and state the courses in which he has passed and is to pass examination, the title of his thesis, and the names of the committee in charge of his work.

The amount of work required for the master's degree shall be equivalent to that done by the senior class. Proficiency shall be determined by examination upon the subject matter of the courses taken and of the thesis.

For the convenience of the student in selecting work the various departments and subjects of study are arranged in groups, as follows:

I. ENGLISH LANGUAGE AND LITERATURE
   (a) English, (b) Comparative Philology
II. ANCIENT LANGUAGES AND LITERATURES
   (a) Greek, (b) Latin, (c) Semitic Languages
III. MODERN LANGUAGES AND LITERATURES
   (a) German, (b) Romance Languages, (1) French, (2) Spanish, (3) Italian, (c) Scandinavian Languages
IV. BIOLOGICAL SCIENCES
   (a) Animal Biology, (b) Botany, (c) Paleontology
V. PHYSICAL SCIENCES
   (a) Chemistry, (b) Geology and Mineralogy, (c) Physics, (d) Agriculture
VI. PURE AND APPLIED MATHEMATICS

(a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics, (e) Engineering

VII. PHILOSOPHY, EDUCATION, AND ANTHROPOLOGY

(a) Philosophy and Psychology, (b) Education, (c) Anthropology

VIII. SOCIAL SCIENCES

(a) Economics and Political Science, (b) History, (c) Sociology and Anthropology

Candidates desiring a master's degree in some special line of study, for the purpose of teaching or research, or as a basis for studies leading to the doctor's degree, must select three subjects of study, a major to occupy at least one-half of the work required, a first minor to occupy one-fourth, which shall be germane to the major subject by being selected from the same group or a closely related group, and a second minor to complete the work required, which last shall be in some reasonable connection with the other subjects selected. In special cases the candidate may be allowed to fill the required time with a major and one minor only. The thesis in this case must embody the results of study and investigation along the line of the major subject. In attaining this specialized master's degree, the thesis is regarded of much importance, and to it the candidate should devote much time and effort. To render this possible, the professor in charge of the major subject may count work assigned in its preparation as part of the time required in that subject.

Candidates desiring a master's degree with a view to general culture will select subjects from three distinct groups, of which the work in no one group shall be less than four hours a week, for the year. The work in one of these groups shall be designated as the candidate's major and to it the subject of his thesis shall stand in close relation. The courses pursued in the major shall be in advance of any regularly pursued by undergraduates.

All theses must be written in satisfactory English and those accepted for the degree of M. S. and M. A. shall be filed with the librarian of the University for cataloguing before distribution to departmental libraries.

Theses for all degrees in the graduate school shall be typewritten on one side only of the sheet, on paper of good linen stock measuring eight and one-half by eleven inches, and shall have a margin of one and one-quarter inches on all sides of the text. The title page of the thesis should be in the following form: (Title of the thesis). "A thesis submitted to the faculty of the Graduate School of the University of Minnesota by (name in full) in partial fulfillment of the requirements for the degree of (name of the degree in full), (date)."

To entitle a candidate to his diploma his thesis should be placed unbound in the hands of the librarian one week before commencement, together with one dollar to cover expense of uniform binding.

Printed theses whose title pages conform to the regulation stated above will also be accepted.

A candidate for the degree of Master of Laws must not only be Bachelor of Laws from a reputable law college having a course equivalent in length to that at the University of Minnesota, but he must in addition have been admitted to the bar in Minnesota. Any person who possesses the requisite legal learning may on registration pursue any or all of the studies offered for this degree, but he thereby acquires no standing as candidate for this degree.

The major selected for this degree will in all cases be Law, and the minors, Political Science and Constitutional History.

THE DOCTOR'S DEGREE. Three degrees of this grade are conferred, viz.: Doctor of Philosophy (Ph.D.), Doctor of Science (Sc.D.), and Doctor of Civil Law (D.C.L.), for still more advanced studv than that leading to the corresponding bachelor's and master's degrees, and such special attainments therein as show power of original investigation and independent research, together with a fair degree of literary skill as evinced by the preparation of a thesis which shall be a contribution to knowledge.

CANDIDACY FOR THE DEGREE OF DOCTOR. Any student in the Graduate School who applies to be enrolled as a candidate for a doctor's degree must, in order to be enrolled as such, possess a reading knowledge of French and German, certified to by the professors respectively in charge of those languages, and in case of an applicant applying to be enrolled as candidate for the degree of Doctor of Civil Law, proficiency in Latin and Roman History is also required. Knowledge of Latin will also be required in certain other cases such as for a major in Medieval History, or Philosophy, as the professor in charge may prescribe.

The applicant must also have made before enrollment such noteworthy advancement in his graduate work as to secure the approval of his candidacy by his instructors. And in particular, he must obtain the written consent of the professor under whom his major subject falls to take charge of his instruction in that subject. His minors must also be acceptable to this professor, who must recommend him to the dean as a suitable candidate for the degree sought.

In order for the applicant to be successful, this professor should also state that, through the work thus far accomplished by the applicant, he has become convinced of his capacity and of his probable ability to carry an investigation in his special field to a successful conclusion and embody it in a valuable thesis.

The Dean shall, after full consideration and consultation with the professor concerned, pass upon his application and have the power to enroll the applicant as candidate or refuse to do so. Such enrollment as candidate must be secured at least one year before the degree will be conferred

It will frequently not be practicable to enroll an applicant as candidate for the doctor's degree before the completion of one year's study in the Graduate School. Graduates desiring to become candidates for this degree will find it advisable, under ordinary circumstances, to spend the first year of graduate study in attaining to the specialized master's degree, as part of the work leading to the doctor's degree.

That procedure is likely to furnish such a decisive test of capacity for advanced study, as well as experience in preparation of a thesis, as to settle definitely the question of candidacy for the doctor's degree.

Candidates for the degree of Doctor of Civil Law are required to secure the degree of Master of Laws as a preliminary.

REGULATIONS. Candidates for the degree of doctor must devote at least three years of graduate study to the subjects approved for candidacy, of which the last year must be spent in residence at the University of Minnesota. In lieu of the other years the candidate may offer an equivalent term of graduate study at some other university, but study pursued and work done *in absentia* without proper facilities of libraries and laboratories will not be accepted.

The same general regulations govern the candidate for this degree as hold in case of the specialized master's degree, both as regards the amount of study per year, the selection and relative amount of major and minors and as regards the chairman of the committee in charge of the work of the candidate, as well as regards the thesis required, which for this degree must give evidence of original and independent research and must be a contribution to knowledge.

In particular, considerable portions of the work on the major and on the thesis may be carried on under general direction of the professor in charge, in which case the candidate will be held responsible for large attainments in the directions indicated, in the form of written reports, reviews and criticism.

The candidate must pass satisfactory written examinations upon his major and minor subject at any time not more than a year prior to the final examination on the major.

In the case of the minors this written examination shall be final. If these examinations are satisfactory and the thesis approved the candidate shall be admitted to a final oral examination upon his major.

The final examination upon the major must show an exhaustive knowledge of the special subject selected, and a large acquaintance with the general field in which the subject lies, but the candidate shall not be admitted to the final examination upon his major until his thesis has been considered by the committee in charge and found satisfactory.

The order of procedure to be followed is this; The candidate for a doctor's degree shall submit the title and the outline of his proposed thesis to the professor in charge of his major for final approval at least as early as the first of October preceding the commencement at which the degree is to be conferred. In case the proposed subject and the outline are acceptable, the candidate shall make a statement in writing to the Dean, as early as the first of the following February, of his intention to present himself for a doctor's degree at the next commencement, giving at the same time the names of the committee in charge of his work, the subjects of his major and minors, and the title of his thesis.

The thesis itself shall be completed in the typewritten form previously prescribed, and delivered to the professor in charge at least one month before commencement. In case the thesis is adjudged satisfactory, the candidate will be admitted by the committee to final examinations upon his major and upon the subject matter of his thesis.

This examination shall be arranged for by the professor in charge of the major, on a date at least two weeks before commencement. It shall be held by a committee of examination of which the professor in charge of the major shall be chairman, consisting of the professors in charge of the minors, and in addition, of such other members of the teaching force as the Dean may appoint as members of this examining committee. In order to do this, the Dean shall be duly informed of the date of the examination by the chairman.

The examining committee shall decide from all the facts within its knowledge, whether the candidate is, in its estimation, entitled to receive the doctor's degree sought, and the chairman shall, without delay, report its findings, in writing, to the Dean and to the Registrar.

Immediately after the final examination, the chairman will deposit the thesis with the librarian as directed above.

In case the report of the committee is favorable, the candidate shall be presented to the faculty of the graduate school, at a meeting called for the purpose, by the professor in charge of his major subject, who shall then make a written statement of the academic life of the candidate, of the character and scope of his examinations, and the scope and value of his thesis.

Any member of the faculty shall then be at liberty to propound any questions he will to the instructors of the candidate, respecting his work, or to the candidate himself, respecting the subject matter of his thesis Upon evidence before it, the faculty shall then decide by vote whether the candidate shall be recommended for the degree.

Courses of Instruction.

The Arabic numerals by which the courses are here designated are those under which they appear in the bulletins of the separate colleges.

The courses which are offered to both undergraduates and graduates may not be selected by graduates as major subjects, but as minors only. The courses offered primarily for graduates include the subjects offered to them as majors.

AGRICULTURE

PLANT BREEDING—FIELD CROPS MR. BULL

Courses in this subject will include research along such lines as may be advisable, in view of the previous training of the student, the available material and facilities for instruction, and the object sought by the candidate.

The prominent features of the course will be a study of history and methods: laws of evolution, heredity, etc.; probabilities, hybridization, selection; nursery and plant manipulation; character plotting; plant economics.

Open to candidates for advanced degrees who have completed a long course in botany and agriculture 1 or their equivalent.

FARM MANAGEMENT MR. WILSON

Reading and research work combined with occasional lectures. Those who wish may choose any subject or problem of farm management that is of personal interest, provided they can get the necessary material for study. Any problem related to farming may be chosen, and must be presented from a practical business standpoint with special reference to profit and loss on the farm. Open as major subject to candidates for advanced degree.

ANATOMY.

This department offers a number of undergraduate courses which may be selected as minors in human and vertebrate Anatomy, Histology, Embryology and Neurology. The department further affords opportunity for graduate students to carry on investigations in any one of these divisions under the direction of the department as a major for the Master's or Doctor's degree.

Courses 3, 10, 13, 17, 22, 27, and 30 are quite suitable for major subjects.

FOR UNDERGRADUATES AND GRADUATES

1. **GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY** MESSRS. LEE AND NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

2. **MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES** MESSRS. LEE AND NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods) Second quarter

3. Micro-Technique and the Morphology of the Special Sense Organs Mr. Lee

Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter

7. Cytology and Histogenesis Mr. Lee

Two credits (four lectures and recitations, two laboratory periods) Third quarter

Prerequisite, courses 3 and 13 or equivalent.

10. Research Work in Human and Vertebrate Morphology Mr. Lee

Properly qualified students will be provided every facility for original investigation of anatomical problems.

11. Elements of Vertebrate Embryology Messrs. Lee and Johnston

Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

12. Advanced Vertebrate Embryology Messrs. Lee and Johnston

Three credits (six lectures and recitations, three laboratory periods) Second quarter

13. Special Embryology of Man and Vertebrates Mr. Lee

Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter

17. Experimental Embryology Mr. Lee

Two credits (four lectures and recitations, two laboratory periods) Fourth quarter

Prerequisite, courses 3 and 13 or equivalent.

20. The Animal Parasites of Man Mr. Nickerson

One credit (hours to be arranged) Third quarter

21. Elements of Mammalian Neurology Messrs. Johnston and Ingbert

Three credits (two lectures and recitations, one laboratory period) Second quarter

22. The Human Nervous System Messrs. Johnston and Ingbert

Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

23. Special and Applied Neurology Messrs. Johnston and Ingbert

One credit (hours to be arranged) Fourth quarter

24. Neurological Technique Mr. Johnston

Two credits (hours to be arranged) Fourth quarter

26. The Nervous System and Mental Life Mr. Johnston

One credit (hours to be arranged) Second quarter

27. Comparative Neurology of Vertebrates Mr. Johnston

One to three credits (hours to be arranged) Second quarter

Intended for graduates; open by special permission to seniors who meet the requirements. Prerequisite, courses 1 and 2, or 3 in Animal Biology, or courses and 12 in Histology and Embryology.

30. Research in Neurology Mr. Johnston

Problems and special work in vertebrate Neurology. Open only to those who are qualified to carry on an investigation.

40. Anatomical Journal Club and Seminar

Weekly meetings during year for reviews of the current literature and discussion of special topics in Anatomy, Histology, Embryology and Neurology, and of the research work being carried on in the department. The department library, which is large and rapidly growing, receives all the leading anatomical journals.

ANIMAL HUSBANDRY

ANIMAL FEEDING AND NUTRITION MR. BOSS

Original investigations in animal feeding with studies of food requirements for maintenance and growth. Problems will be arranged to suit the training and needs of the individual student.

MEATS—STRUCTURE—COMPOSITION AND PREPARATION FOR USE MESSRS. BOSS AND GAUMNITZ

A course in which special consideration is given to the structure and composition of meats and to processes of ripening and curing them for food purposes. Original investigations will be required and equipment and material furnished for extensive study in this line.

ANIMAL BIOLOGY

Graduates, whether candidates for a degree or not, will be admitted to any line of research or advanced work that can be carried on profitably.

Less advanced graduates will be admitted to any regular classes of the department for which they are sufficiently prepared.

All advanced students are expected to take an active part in the Journa Club and the Biological Club.

Students who contemplate taking advanced work are advised to confer with the head of the department.

FOR UNDERGRADUATES AND GRADUATES

10. **HISTORY OF ZOOLOGY** MR. NACHTRIEB

Two credits (two hours per week) First semester

Open to juniors and seniors; students are advised to complete course 1 before electing this course.

A course of lectures on the history of zoology from ancient times to the present including a brief history of our domestic animals and those that have become extinct within historic times, and a discussion of the modern theories and problems of heredity and evolution.

11. **ANIMAL HABITS AND INTELLIGENCE** MR. NACHTRIEB

Two credits (two hours per week) Second semester

Open to juniors and seniors; students are advised to complete course 1 before electing this course; alternates with course twelve.

The course consists of lectures and discussions on animal habits and intelligence, and concludes with a consideration of the development of mental power in animals.

12. **ECONOMIC ZOOLOGY** MR. NACHTRIEB

Two credits (two hours per week) Second semester

Open to juniors and seniors; alternates with course 11.

Lectures on the uses made of animals and their products, the production and protection of those animals of special economic importance, and the methods of protection against some of the disease-producing animals.

13. **TEACHERS' COURSE** MR. NACHTRIEB AND ASSISTANT

One credit (one hour per week) First semester

Open to those who have completed a minor in zoology; given in alternat. years.

Lectures and discussions on the ends to be obtained through courses in genera zoology and the methods and means by which such ends may be gained.

FOR GRADUATES

14. **PROBLEMS AND RESEARCH** PROFESSOR NACHTRIEB AND ASSISTANTS

Six or twelve credits (six or twelve hours per week) Both semesters

Open to those who have completed courses 1 and 3 or 1 and such other work as may be required by the instructor in charge; both semesters must be completed before credit is given for the first semester.

The course consists of advanced or essentially independent work carried on in some specific line under the direction of the professor in charge of that work. The lines of work open at present are:

(a) Morphololoogy of vertebrates under Mr. Brown
(b) Blood, connective tissue and excretory organs of vertebrates under Mr. Downey
(c) Entomology under Mr. Oestlund
(d) Experimental zoology
(e) General physiology under Mr. Nachtrieb
(f) Invertebrate embryology under Mr. Sigerfoos
(g) Invertebrate morphology under Mr. Sigerfoos
(h) Vertebrate embryology or morphology under Mr. Nachtrieb

ASTRONOMY

FOR UNDERGRADUATES AND GRADUATES

3. **Practical Astronomy** Mr. Leavenworth

Six or twelve credits (three or six hours per week Both semesters

Open to juniors and seniors who have completed course 1 and mathematics 5, 6, and 7.

Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares.

FOR GRADUATES

4. **Advanced Practical Astronomy** Mr. Leavenworth

Six credits (three hours per week) Both semesters

Open to graduate students who have completed courses 1 and 2.

Celestial Mechanics Mr. Leavenworth

Six credits (three hours per week) Both semesters

Open to graduate students who have completed courses 1 and 2.

6. **Astrophotography** Mr. Leavenworth

Both semesters

Open to graduate students who have completed courses 1 and 2.

Photography of the heavenly bodies, measurement of plates, determination of positions, parallax, etc.

BOTANY

Students entering the department for the first time must take course 1, or present a satisfactory equivalent. Courses 1 and 2 are required for entrance to all advanced courses, with the exception of 11 to 15. Students are requested to confer with the head of the department before electing an advanced course.

The Botanical Seminar consists of advanced students in botany, together with the staff of the department. It meets every two weeks for the presentation of the results of investigation, and for the discussion of current problems.

Laboratory fee for each undergraduate course is three dollars per semester

FOR UNDERGRADUATES AND GRADUATES

2. ADVANCED BOTANY — MESSRS. CLEMENTS AND ROSENDAHL
Six credits (six hours per week) — Both semesters

Open to those who have completed course 1.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissues and of reproduction; and the general relations of the plant to the physical factors of its home. Lectures and quizzes, laboratory, greenhouse and field work.

SPECIAL COURSES

3. PLANT PHYSIOLOGY AND ECOLOGY — MR. CLEMENTS AND MR. HUFF
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2.

A study of the factors that affect the plant and its response to them; the adaptations of plants and the origin of new forms; the structure and development of vegetation, as shown in migration, invasion, competition, etc. Lectures and quizzes, greenhouse and field work.

4. ALGAE — MISS TILDEN
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

A detailed comparative study of the structure and classification of the algae: the blue-green and yellow-green algae, together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. FUNGI — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. MOSSES AND FERNS — MR. ROSENDAHL AND MR. HUFF
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lectures, laboratory and field work.

7. FLOWERING PLANTS — MR. ROSENDAHL
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1 and 2

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. ECOLOGY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters

Open to those who have completed courses 1, 2 and 3.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. PLANT PHYSIOLOGY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1, 2 and 3; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability and reproduction. Class discussions and quizzes, greenhouse and field work.

10. CYTOLOGY — MR. ROSENDAHL
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis together with a review of the history of cytologic investigation. Methods of cytological research indicated in the laboratory. Laboratory work and collateral reading.

11. INDUSTRIAL BOTANY — MISS TILDEN
Six credits (six hours per week) — Both semesters
Open to technical students who have completed course 1 and to academic students who have completed courses 1 and 2.

A study of the origin, distribution, and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

13. WATER SUPPLY BOTANY — MISS TILDEN
Three credits (six hours per week) — Second semester
Open to those who have completed course 1.

A technical course for municipal, sanitary and reclamation engineers involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of their control or prevention. Lectures and references, laboratory and field work.

14. TIMBER AND TIMBER DISEASES — MR. HUFF
Three credits (six hours per week) — First semester
Open to those who have completed course 1.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work and references.

15. BOTANICAL MICROCHEMISTRY — MR. CLEMENTS
Six credits (six hours per week) — Both semesters
Open to those who have completed course 1.

A microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.

16. PLANT STUDIES AND METHODS — MR. CLEMENTS
Six credits (six hours per week) — Both semesters
Open to those who have completed courses 1 and 2.

A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are to be taught and not from the university point of view; the material is taken up in detail in its proper sequence, and training in method is afforded as far as possible by practice in the elementary school of the College of Education.

FOR GRADUATES

17. MORPHOLOGY AND TAXONOMY — MR. ROSENDAHL
Both semesters

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Three credits (six hours per week).

Open to those who have completed [illegible]

A study of the source and [illegible] reference to their mechanical properties [illegible] and methods of timber preservation. [illegible]

15. Botanical Microchemistry

Six credits (six hours per week).

Open to those who have completed [illegible]

A microscopical study by means of [illegible] structure of plant substances in the natural [illegible] duct. Lectures, laboratory and reference [illegible]

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Open to graduate students; other arrangements may be ascertained upon application to the department.

Important literature and necessary material will be provided for whatever research is entered upon, and the results of the investigations will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it.

18. PROBLEMS IN ALGOLOGY MISS TILDEN
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be done on special groups or along any of the following lines: The freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-depositing algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island, which is open during the summer vacation.

19. PROBLEMS IN PHYSIOLOGY AND ECOLOGY MR. CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Opportunity for research work in ecology and physiology is offered along the following lines: Critical investigation of the physical factors of the habitat by means of instruments; studies in plant functions and adaptations; the experimental production of new forms; investigations in the development and structure of vegetation, and especially in migration, competition, etc.

20. PROBLEMS IN CYTOLOGY AND EMBRYOLOGY MR. CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be taken along any of the following lines: The minute structure of the cell; microchemistry of the cell; development of sporangia and spores; fecundation; development of the embryo; origin and development of the primary tissues; development of organs; correlation, etc.

CHEMISTRY

FOR UNDERGRADUATES AND GRADUATES

4. QUANTITATIVE-ANALYSIS MR. SIDENER AND ASSISTANTS
Six credits (six hours per week) Both semesters
Prerequisite, Course 3. The laboratory fee is seven dollars per semester.

The course includes a general discussion of quantitative methods, with laboratory work in gravimetric analysis, first semester; followed by a discussion of standard solutions and the necessary stoechiometric calculations with laboratory work in volumetric analysis, second semester.

5. ORGANIC CHEMISTRY. MESSRS. FRANKFORTER, DERBY, HANDY AND ASSISTANTS
Six credits (three lectures and twelve hours of laboratory work per week)
Prerequisite, Course 3. Second semester

This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.

6 THEORETICAL CHEMISTRY MR. DERBY
Two credits (one lecture and one recitation per week) Second semester
Prerequisite, Course 5.

This course involves a study of the most important theories which coordinate and unify chemical and physico-chemical phenomena.

18. **Physical Chemistry** Mr. Derby
Three credits First and second semesters
Prerequisites, Chemistry 5, Physics 3 and 4.

The course enables the student to gain a wide and varied knowledge of physico-chemical principles and methods, both from the theoretical and practical standpoint.

24. **Theoretical Electrochemistry** Mr. Derby
Three credits First semester
Prerequisites, Same as for Physical Chemistry.

This course includes the development of the most modern ideas relative to electrochemical principles and phenomena, involving therewith the electron theory and electrical nature of matter.

25. **Radiochemistry** Mr. Derby
Three credits Second semester

This course is intended to follow the one in Theoretical Electrochemistry and has to do with the phenomena associated with the various radioactive elements including the chemical change which these elements undergo and the chemical reactions which may be induced while the changes are in progress

FOR GRADUATES

The following are open to graduate students. Arrangements may be made upon application to the department.

27. **Special Inorganic Chemistry.**
28. **Electrochemistry.**
29. **Organic Chemistry.**
30. **Alkaloids.**
31. **Analytical Chemistry.**

COMPARATIVE PHILOLOGY

This department, besides offering courses in the general principles of linguistic science, affords an opportunity for elementary studies in comparative Indo-European philology, and more particularly the investigation of Old Germanic dialects. Related courses in English philology will be found under English language and literature.

FOR UNDERGRADUATES AND GRADUATES

3. **Introduction to Teutonic Philology** Mr. Klaeber
One credit (one hour per week) Second semester
Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 4.

History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the German languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German).

5. **Philological Seminar** Mr. Klaeber
Two credits (two hours per week) Second semester
Open to juniors and seniors who have completed course 1; alternates with course 6.

Investigation of linguistic problems. Study of standard works (Paul, Delbrueck Wundt, Jespersen, etc.). Reports on recent publications.

6. **Comparative Phonology of English and German** Mr. Klaeber

Two credits (two hours per week) Second semester

Open to juniors and seniors who have a fair knowledge of German.

Elements of phonetics; history of English and German sounds; orthography. The lectures will be supplemented by practical exercises.

FOR GRADUATES

7. **Comparative Grammar of the Greek, Latin, and Germanic Languages** Mr. Klaeber

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

A general survey of the field of Indo-Germanic philology will be included.

8. **Gothic** Mr. Klaeber

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

The relation of Gothic to other Germanic dialects will be particularly emphasized. Study of the grammar (Braune, J. Wright, Streitberg) and reading of the gospels (Heyne's *Ulfilas*, 10th edition).

9. **Urgermanische Grammatik** Mr. Klaeber

Open to graduate students who have completed course 8; other arrangements may be ascertained upon application to the department.

Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, etc.).

10. **Old Saxon** Mr. Klaeber

Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.

Old Saxon Grammar and interpretation of the *Heliand*.

11. **Old High German** Mr. Klaeber

Open to graduates who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department

Braune's *Althochdeutsche Grammatik:* Braune's *Althochdeutsches Lesebuch*.

This course is identical with German 14.

ECONOMICS

FOR GRADUATES AND UNDERGRADUATES

4. **Advanced Economics** Mr. Robinson

Three credits (three hours per week) Second semester

Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution.

Assigned readings, reports, and discussions.

5. **Money and Banking** Mr. Phelan

Three credits (three hours per week) Repeated each semester

Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings and discussion

5b. **Financial History of the United States** Mr. Phelan

Three credits (three hours per week) Second semester

Open to those who have completed courses 1 and 5a.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, topics and discussions.

6. PUBLIC FINANCE — MR. ROBINSON

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of the leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidents, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION — MR. ROBINSON

Three credits (three hours per week) — Second semester

Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, *Essays in Taxation*, and reports of state tax commissions with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION — MR. ROBINSON

Three credits (three hours per week) — Second semester

Open to those who have completed course 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcels post and express service; economic function and relations of highways, interurban electric lines, steam railways, inland waterways and ocean transportation; the organization of ocean commerce. Lectures, assigned readings, and discussions.

9. RAILWAY ECONOMICS — MR. ROBINSON

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 and 8, and to students in the technical colleges.

An advanced course devoted to the study of railway problems and administration, including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5) the great railway systems of the United States; (6) regulation by the states and the federal government; (7) government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings, and special topics.

11. THE MODERN BUSINESS CORPORATION — MR. GRAY

Three credits (three hours per week) — First semester

Open to those who have completed

The organization, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. Text-books: Ripley, *Trusts, Pools, and Corporations*, Meade's *Trust Finance*, Wyman's *Cases* Lectures, class discussions, and reports.

10. MUNICIPAL INDUSTRIES — MR. GRAY

Three credits (three hours per week) — Second semester

Open to those who have completed course 1; if possible, should be preceded by course 11.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership of such industries. The general question of municipal ownership. Text-books, lectures, and quizzes.

12. ECONOMICS OF COMMERCE — MR. ROBINSON

Three credits (three hours per week) — First semester

Open to those who have completed course 1, 2, or 3

Causes and characteristics of commercial crises; theory and mechanism of international commerce; free trade, reciprocity and protection by the balance of trade, economic causes of the contest for foreign markets; organization of the export trade, commercial treaties and foreign politics, the consular and diplomatic service as a factor in commerce. Lectures, assigned readings, and reports on special topics.

13. ECONOMICS OF COLONIZATION — MR. ROBINSON

Three credits (three hours per week) — Second semester

Open to those who have completed course 1, 2, or 3.

The economic causes of human migration; historical survey of colonization and classification of colonies with reference to their economic bases; existing colonial systems, with special attention to the outlying possessions of the United States; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings, and reports on special topics.

14 ECONOMIC REFORMS — MR. PHELAN

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A survey of social Utopias from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform. Lectures, assigned readings, reports, and discussions.

15. THE STATE IN RELATION TO INDUSTRY — MR. PHELAN

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 and 26.

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; the results of economic legislation designed to limit the freedom or to raise the plane of competition. General survey of the relation of the state to industry. Lectures, assigned readings, and reports.

16. LABOR PROBLEMS: Part I — MR. PHELAN

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social well being. Lectures, text-book, assigned readings, and discussions.

17. LABOR PROBLEMS: Part II — MR. PHELAN

Three credits (three hours per week) — Second semester

Open to those who have completed course 1, but should also be preceded by course 16.

A study of races and immigrants in America, with reference to their economic and social contributions; the economic and social conditions in foreign countries that lead to emigration; the general problem of immigration; the special problems of the Slav, the Italian, the negro, the Chinese and the Japanese. Lectures, textbook, topics, and discussions.

18. ECONOMIC CONDITIONS IN AMERICAN CITIES — MR. LIBB

Three credits (three hours per week) — First or second semester

Open to those who have completed course 1, course 3, or sociology 1; required in the six-year medical course.

A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment. Given by lectures with assigned readings and visits of inspection in the Twin Cities.

19. BUSINESS ORGANIZATION — MR. RASTALL
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

General organization of the business field for productive efficiency. Competitive vs. monopolistic industry. Division of industry as a problem before the entrepreneur. The importance of division and organization of production processes within the individual plant. Mismanagement and waste. The internal organization and management of large scale industry disclosing the elements of its technical advantages. Typical manufacturing and mercantile concerns in success and failure. Based on Sparling's *Introduction to Business Organization* with lectures, assigned readings and discussions.

20a. THE PRINCIPLES OF ACCOUNTING — MR. RASTALL
Three credits (three hours per week) — First semester
Open to those who have completed course 1.

Fundamentals in the theory and practice of accounting with a view to general business efficiency. The accountant, his essential qualities and work. Aims and essentials of a desirable system of accounts. The mathematical philosophy underlying all accountancy developing the demonstration of the principal specific fields of accounting. Practical application of all points of theory through numerous accounting sets taken from those in actual use in the business field.

Largely a laboratory course, with text and lectures.

20b. CORPORATION ACCOUNTING — MR. RASTALL
Three credits (three hours per week) — Second semester
Open to those who have completed courses 1 and 20a.

The theory and general practice of modern systems of expert accounting. The general corporation and its financial accounts. The operating accounts, general office accounts, and reports, of manufacturers, telegraph and express companies, banks, insurance companies, and transportation companies. Special studies in cost, voucher, and loose leaf systems. Economical accounts. Examination of typical published reports from the standpoint of accountancy and interpretation. Inspection of the systems of running corporations.

20c. PROBLEMS IN EXPERT ACCOUNTING — MR. RASTALL
Three credits (three hours per week) — First semester
Open to those who have completed courses 1, 20a and 20b.

• Lectures on concrete problems of the type confronting the general public accountant and class exercises taken largely from examinations for chartered public accountants, the aim being to give such information as shall be most suggestive and useful in preparing for C. P. A. examinations. Given alternate years with course 20d.

20d. AUDITING — MR. RASTALL
Three credits (three hours per week) — First semester
Open to those who have completed courses 1, 20a and 20b.

The principal duties and qualifications of the auditor. The nature of his work and the problems that confront him. Auditing in various types of industries. Numerous practical problems and audits of books of going concerns. Lectures and laboratory. Given alternate years with course 20c.

21. ELEMENTS OF BUSINESS LAW — MR. PHELAN
Three credits (three hours per week) — Second semester
Open to those who have completed course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in every day business affairs. Assigned readings, lectures, and quizzes.

22. Materials of Commerce — Mr. Coulter
Three credits (three hours per week) — Second semester
Open to those who have completed course 2a.

A study of the principal wares of commerce with reference to sources, uses and industrial processes. Text with collateral reading, lectures and visits of inspection.

23. Economics of Forestry and Irrigation — Mr. Coulter
Three credits (three hours per week) — First semester
Open to those who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

24a. History and Literature of Agricultural Industries — Mr. Coulter
Three credits (three hours per week) — First semester
Open to those who have completed course 1 or 2.

Historic development of, and attitude toward, agriculture in ancient, mediaeval and modern times, and comparison of systems with reference to stage of economic development and geographic conditions. A more detailed study of the history of agriculture in the United States. Lectures, assigned readings, reports on special topics, quiz.

24b. Economics of Agricultural Industries — Mr. Coulter
Three credits (three hours per week) — Second semester
Open to those who have completed course 24a, and others by special permission.

Economic principles which underlie farm and estate management, land values, and price of farm produce; preparations of produce for market, market and transportation problems. The size, ownership, organization and labor system of farms as bearing on economic efficiency and social and political conditions. Farm organizations and co-operation. Lectures, assigned readings, reports on special topics, quiz.

25a. Investment and Speculation — Mr. Rastall
Three credits (three hours per week) — First semester
Open to those who have completed course 5a.

The social significance of the processes of saving and investing. Private property as the basis of investment. Funds, credit instruments and other machinery of investment. Investment markets. Historic investment opportunities, transition periods, and effect of economic progress. Laws of investment values and causes affecting values. Special studies in the various classes of investments, real estate, loans, general business, stocks and bonds. Organization and working of stock and produce exchanges. Wall Street. Investment vs. Speculation vs. Gambling.

Lectures, assigned readings and exercises in the interpretation of quotations, financial articles and market reports. Given alternate years with course 25b.

5b. The Mathematics and Accountancy of Investment — Mr. Rastall
Three credits (three hours per week) — First semester
Open to those who have completed Mathematics 3 and Economics 1.

A study of the mathematical principles underlying computations in foreign xchange, banking, statistical investigation, insurance, building and loan associations rust company business, bond issues, sinking funds, etc. The development of th.

formulas and tables used in such computations and numerous practical problems. The accountancy of earnings, interest, depreciation and fluctuating values as under the above. The use of short cuts, tables and mechanical aids. Lectures, laboratory practice and problems. Given alternate years with course 25a.

26a. PERSONAL INSURANCE (Life and Accident) MR. RASTALL
Three credits (three hours per week) Second semester
Open to those who have completed course 1.

The general theory and practice of life and accident insurance. History and evolution of life insurance and the modern life policy. The social functions of insurance and its importance in the business world. Development of the science of insurance explaining the different types of policy and the technical meaning of premium, reserve, dividend, surplus, expectation of life, annuities, surrender values, extensions, loans, paid up insurance etc. The personal insurance problem and its solution. Types of insurance organizations and companies. Public regulation. Lectures and assigned readings. Given alternate years with course 26b.

26b. PROPERTY INSURANCE MR. RASTALL,
Three credits (three hours per week) Second semester
Open to those who have completed course 1

The basic theory of fire insurance. The historic development, peculiarities and practice of various forms of property insurance, including storm, boiler, marine, fire and miscellaneous. A technical study of an insurance company of each type, Critical examination of policy contracts, exemptions, forfeitures, abandonments, co-insurance, adjustments, and other questions of procedure under insurance contracts. Lectures and assigned readings. Given alternate years with course 26a.

27. COMMERCIAL CREDIT MR. RASTALL
Three credits (three hours per week) Second semester
Open to those who have completed courses 1 and 22.

The forms and uses of credit. Its importance in the business world and its dangers. The work of the credit man. Commercial agencies and other safeguards. Credit institutions in their relation to business. Credit in individual success and failure, in social prosperity and crises. Given alternate years with course 28.

28. ADVERTISING MR. RASTALL
Three credits (three hours per week) Second semester
Open to those who have completed courses 1 and 19.

The use of advertising in modern business. Various types of advertising and of advertising methods. Advertisement writing. Methods of following up and checking results. Examples of advertising campaigns and their results. Given alternate years with course 27.

FOR GRADUATES

29. THEORY AND PRACTICE OF STATISTICS MR. RASTALL
Two credits (two hours per week) First semester
Open to those who have completed six credits in economics.

A study of statistical method and the work of the statistician. General critical survey of present day statistical information. Correct principles of collection, tabulation, classification and interpretation of statistical material. A first hand investigation into some practical problem by the class. Lectures, assigned readings and seminary work on the special problem.

30a. HISTORY OF ECONOMIC THOUGHT MR. ROBINSON
Two credits (two hours per week) First semester
Open to those who have completed six credits in economics.

A survey of economic thought covering ancient, medieval and modern times, with emphasis on the period since 1850. Assigned readings, and reports on specal topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

30b. METHODS OF INVESTIGATION AND INSTRUCTION IN ECONOMICS MR. ROBINSON
Two credits (two hours per week) Second semester

Open to those who have six credits in economics.

The scope and logical methods of economics; relation of economics to the other social sciences and to ethics: methods of carrying on investigations and of giving instruction in economics.

Assigned readings and reports on special topics, which will furnish the basis of class discussions. The work will be conducted in an informal manner, approaching somewhat the seminar plan.

31. SEMINAR IN ECONOMICS MESSRS. GRAY, ROBINSON AND ASSISTANTS
Twelve credits (three hours per week) Both semesters

Open to those who have completed at least twelve credits in economics and are capable of making original investigations; both semesters must be completed before credit is given for the first semester.

A course in research and in methods of investigation. The course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests.

ECONOMIC ENTOMOLOGY

FOR GRADUATES

SPECIAL PROBLEMS IN ECONOMIC ENTOMOLOGY MR. WASHBURN
Both semesters

EDUCATION

FOR UNDERGRADUATES AND GRADUATES

Preliminary Requirements: Students who desire to undertake graduate work in education must have a general knowledge of psychology and of the history of education, and some acquaintance with the theory of education. For a minor in education the candidate may pursue studies either in the theory and practice of elementary teaching, the organization and methods of secondary education, or in advanced educational theory and administration. Students who undertake a major in education are expected to do work in at least two of these fields. Selection will be made by the candidate on the approval of the head of the department from the following courses:

4. SECONDARY EDUCATION MR. JAMES
Three credits (three hours per week) First semester

Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports, and discussions.

5. PRINCIPLES AND ORGANIZATION OF ELEMENTARY TEACHING MR. RANKIN
Three credits (three hours per week) First semester

Open to seniors who have completed courses 1 and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions and reports. It is planned for all students who expect to teach in the high school or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING — MR. RANKIN
Three credits (three hours per week) — Second semester

Open to seniors who have completed courses 1 and 2, and who have completed course 4 or are pursuing course 10.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

8. SCHOOL ADMINISTRATION — MR. RANKIN
Three credits (three hours per week) — First semester

Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports, and discussions; the organization of school systems, the work of school boards, superintendents, principals, and teachers. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION — MR. RANKIN
Three credits (three hours per week) — Second semester

Open to seniors; intended only for students with experience in teaching; credit will not be given both for course 8 and for course 9.

An advanced course treating of the duties of principals and superintendents.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS — MR. JAMES
Three credits (three hours per week) — Second semester

Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England, and the United States, with special reference to principles and methods of administration. Elementary, secondary, and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports, and discussions.

FOR GRADUATES

11. MODERN EDUCATIONAL THEORIES — MR. JAMES
Three credits (three hours per week) — Second semester

Open to seniors who have completed courses 1 and 2, and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.

12. CURRENT PROBLEMS IN ELEMENTARY TEACHING — MR. RANKIN
Two credits (two hours per week) — First semester

Open to seniors and graduate students who have completed course 5.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor through readings, the visiting of schools, and through class discussions.

13. EDUCATIONAL CLASSICS — MR. JAMES
Two credits (two hours per week) — First semester

Open to seniors who have completed courses 1 and 2, and to graduate students.

A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.

14. CURRENT PROBLEMS IN SECONDARY TEACHING — MR. RANKIN
Two credits (two hours per week) — Second semester

Open to seniors and graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching experience, or who wish to pursue a theoretical and a practical study of some current problems in connection with secondary teaching. The course will be conducted by lectures, class discussions, readings, and by the visiting of schools.

15. PROBLEMS IN SCHOOL ADMINISTRATION — MR. JAMES
Two credits (two hours per week) — Second semester
Open to seniors and graduate students who have completed courses 1 and 2.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions falling within the proposed field.

16. SCHOOL SANITATION — MR. RANKIN
Two credits (two hours per week) — First semester
Open to seniors and graduate students.

This course will be conducted by text, by lectures, and by investigations into problems of school lighting, heating, ventilation, and other questions of school architecture and management connected with the physical well being of the pupils.

17. ORGANIZATION OF HIGHER EDUCATION — MR. JAMES
One credit (one hour per week) — Second semester
Open to seniors and graduate students who have completed courses 1 and 2.

This course is intended for students who are interested in the general problems of educational administration and who look forward later to college teaching. It includes an historical sketch of the development of the American university, with discussions of modes of organization and administration problems of departmental teaching, and questions of class instruction.

20. HISTORY OF RELIGIOUS EDUCATION — MR. SWIFT
One credit (one hour per week) — First semester
Open to juniors, seniors, and graduate students.

An introductory study of the development of the religious consciousness and of the aim, means, and methods of religious instruction among certain types selected from ancient and modern civilizations.

21. PRINCIPLES OF RELIGIOUS EDUCATION — MR. SWIFT
One credit (one hour per week) — Second semester
Open to juniors, seniors, and graduate students.

A study of the most important principles of education viewed from the standpoint of their relation and application to religious activities and institutions and also to the means, methods, and materials of religious instruction.

ELECTRICAL ENGINEERING

The courses offered by the department of electrical engineering are open to graduate students having the required preliminary training. Thorough courses in physics and mathematics are essential prerequisites. The laboratory, shop and library of the department provide facilities for a moderate amount of research work in addition to the regular course of study.

THE LABORATORY EQUIPMENT includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant current and constant potential direct current generators and motors, single phase and polyphase alternators, commuting, induction and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, fans and brakes afford convenient and ample means for taking up the energy of dynamos and motors. To facilitate testing, there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines

Power is obtained from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of The Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 2,250 volts. The laboratory has equipment for obtaining low voltage direct or alternating current up to 2,000 amperes, for continuous EMF up to 2,000 volts and for alternating EMF up to 40,000 volts. An excellent assortment of instruments of well-known American and foreign makers is available for laboratory use. A well equipped standardizing laboratory furnished with certain standards of current electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a wide variety of arc and incandescent lamps and meters with all necessary standards and other accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes and for the formation and study of electric furnace products. Alternators, rotary converters, transformers, lamps, motors, condensers, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation.

THE DEPARTMENT LIBRARY contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being collected and bound. These, with the files in the general and other departmental libraries of the University, offer excellent farcilities for research work. The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests.

FOR UNDERGRADUATES AND GRADUATES

1. APPLIED ELECTRICITY — MR. SHEPARDSON

Three credits (three hours per week) — Second semester

Required of juniors E. E. course.

Preparation, course 5 P.

Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

2. ELECTRICAL MACHINERY — MR. SPRINGER

Three credits (six hours per week) — First and second semesters

Preparation, course E. E. 1, P. 5, 6, and M. 5, 6.

Electrical engineering measuring instruments and their use; units; theory of dynamo electric machinery; methods of regulation, construction and operation of generators and motors; methods of testing.

6. ALTERNATING CURRENTS — MR. SHEPARDSON

Two or three credits (two or three hours per week)

First and second semesters

Post senior year. Preparation: courses 1, 2.

Phenomena, measurement and use of alternating currents; theory of line, transformer, generator and motor; types of apparatus. Text-book: Steinmetz, *Alternating Current Phenomena.*

7. ELECTRICAL ENGINEERING PRACTICE. Batteries — MR. RYAN

One credit (one hour per week) — First semester

Post senior year. Preparation: course 2.

General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Text-book: Lyndon, *Storage Battery Engineering*.

8. ELECTRICAL ENGINEERING PRACTICE. Lighting — MR. SHEPARDSON
One credit (one hour per week) — First semester
Post senior year. Preparation: course 2.

Comparison of different sources of light; photometry; physics of the arc; history, design and regulation of arc lamps; adaptation to constant current, constant potential and A. C. circuits; carbons; history, manufacture and economy of incandescent lamps; distribution of light.

9. ELECTRICAL ENGINEERING PRACTICE. Central stations — MR. RYAN
Two credits (two hours per week) — First or second semester
Post senior year. Preparation: courses 2 and 6 E. E.

Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas and water power; location, design and erection of station buildings; boilers, engines, dynamos, storage batteries, switch board and lines; operation and regulation; maintainance of plant; emergencies; examination of stations in Minneapolis and St. Paul.

10. ELECTRICAL ENGINEERING PRACTICE. Railways — MR. SPRINGER
One credit (one hour per week) — Second semester
Post senior year. Preparation: E. E. 2 or E. E. 4

History and development; different systems of distribution; location and calculation of feeders; line and track construction; choice of motors, trucks, generators and engines; operation and repairs. Text-book: Gutshall, *Electric Railway Economics*.

11. ELECTRICAL ENGINEERING PRACTICE. Transmission — MR. SHEPARDSON
One credit (one hour per week) — Second semester
Post senior year. Preparation: courses 1, 2 and 5 E. E.

Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current, constant potential and alternating systems; design of line; study of particular plants.

12. ELECTRICAL ENGINEERING PRACTICE. Telegraph and telephone
MR. SHEPARDSON
One or two credits (one or two hours per week) — Second semester
Post senior year. Preparation: E. E. 1 and E. E. 5.

Various systems and instruments used in local and long distance telegraphy and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.

ELECTROCHEMISTRY — MR. SHEPARDSON
One or two credits (one or two hours per week) — First or second semester
Post senior year.

Theoretical and experimental study of electrolytic and electrothermal processes.

14. ELECTRICAL DESIGN — MR. RYAN
Three credits (six hours per week) — First semester
Post senior year. Preparation: courses 1 and 2 P., courses E. E. 1, 2 and M. E. 13.

Problems in designing circuits, electro-magnets and dynamos; complete working drawings and specifications to accompany each design.

15. ELECTRICAL DESIGN — MR. RYAN
Three credits (six hours per week) — Second semester
Post senior year. Preparation: courses 6 and 14 E. E.

Design of a transformer, switchboard and other problems.

16. ELECTRICAL DESIGN — MR. RYAN
Two credits (four hours per week) — Second semester
Post senior year. Preparation: courses 8 and 14 E. E.

Designs, specifications and estimates for an electric light or power plant.

17. ELECTRICAL LABORATORY MR. SPRINGER
Three credits (six hours per week) First and second semesters
Senior year. Preparation: courses P. 5, 6 and 1 and 2 E. E.

Tracing circuits and locating faults; electrical engineering measurements; calibration of instruments; operation and characteristic curves of generators and motors.

18. ELECTRICAL LABORATORY MR. SPRINGER
Three credits (six hours per week) First and second semesters
Post senior year.

Experimental study of alternating currents; regulation and efficiency tests of alternators, transformers, motors and rotaries; photometric tests of incandescent and arc lamps.

19. ELECTRICAL LABORATORY MESSRS. SHEPARDSON AND SPRINGER
One or two credits (two or four hours per week) First or second semester
Post senior year. Efficiency tests and special problems.

20. ELECTRICAL ENGINEERING MEASUREMENTS MR. SPRINGER

Application of measurements to electrical engineering practice. Lectures and laboratory.

21. PLANT OPERATION MESSRS. RYAN, MARTENIS AND DIXON
One credit (equivalent to two hours per week) First or second semester

Practice in operation and care of gas engines, gas producers, boilers, engines, turbines, dynamos, battery and switch board and auxiliary apparatus of the University lighting plant.

22. JOURNAL READING (Post senior I and II.) MR. SHEPARDSON
One credit First and second semesters
Post senior year.

Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of the American Institute of Electrical Engineers.

23. PRECISE ELECTRICAL ENGINEERING MEASUREMENTS MR. SPRINGER
Preparation, course 19.

Lectures and laboratory work Precise measurements of resistance, voltage, current, self-induction and capacity; standardization of measuring instruments. Open to limited number subject to approval.

24. ILLUMINATING ENGINEERING MR. SHEPARDSON

Lectures and laboratory work. Investigation of performance of electric and gas lamps, reflectors and diffusers; luminous efficiency, distribution, color characteristics, physiological phenomena, methods of determining location, kind and quantity of lights for obtaining desired illumination.

25. TELEPHONE ENGINEERING MESSRS. SHEPARDSON AND EDDY

Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus; line and line phenomena, including induction, transpositions, loading coils, etc.

26. ALTERNATING CURRENT PHENOMENA MR. SHEPARDSON

Lectures and laboratory work. Study of wave forms, transient phenomena; oscillographic investigations; tests of apparatus.

ENGLISH LANGUAGE AND LITERATURE

FOR GRADUATES AND UNDERGRADUATES

3 EARLY ENGLISH MESSRS. KLAEBER AND BEACH
Six credits (three hours per week) Both semesters

Open to sophomores, juniors and seniors; required of all who take a major or obtain a teacher's certificate.

A study of the language and reading of representative selections of old English prose and poetry. The relation to modern English will be particularly emphasized.

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE — MR. KLAEBER
Two credits (two hours per week) — First semester

Open to sophomores, juniors, and seniors, who have taken the first semester of course 3; alternates with course 5.

An outline of middle English grammar including the interpretation of selected texts.

5. PIERS THE PLOWMAN — MR. KLAEBER
Two credits (two hours per week) — First semester

Open to sophomores, juniors, and seniors, who have taken the first semester of course 3; alternates with course 4; not given in 1908-9.

A critical study of *Piers the Plowman*.

13. THE BIBLE AS LITERATURE — MRS. POTTER
Three credits (three hours per week) — Second semester

Open to juniors and seniors.

A literary study of the Old Testament with special attention to forms and the critical study of selected readings.

16. CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA — MISS PECK
Six credits (three hours per week) — Both semesters

Open to seniors who have completed two years of work in English, which must include course 15.

First semester: a study of the theory of the drama, with the history of English drama to the middle of the nineteenth century. Second semester: a study of the inter-relation of the English with the continental drama in the late nineteenth century with special emphasis upon Ibsen.

19. HISTORY OF LITERARY CRITICISM — MR. BURTON
Two credits (one hour per week) — Both semesters

Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.

This course traces the rise, growth and present condition of the principles of criticism as applied to literature.

24. SENIOR SEMINAR IN ENGLISH — MISS PECK
Two credits (one hour per week) — Both semesters

Open to seniors who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.

Hakluyt's Voyages will be studied in 1908-9. The work will consist of an inquiry into the vivid and dramatic sources of the language and literature found in this "prose epic" of the Elizabethan seamen.

FOR GRADUATES

25. ANGLO-SAXON — MR. KLAEBER
First semester

Open to graduates who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

26. BEOWULF — MR. KLAEBER
Second semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

28. SHAKESPERE — MRS. POTTER

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

29. THE DRAMA AS A LITERARY FORM — MR. BURTON
Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

30. FICTION AS A LITERARY FORM — MR. BURTON
Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

FORESTRY

Equipment: The vast lumbering operations in the northern part of Minnesota offer the best opportunities for a study of that branch of forestry. The establishment of the Chippewa Forest Reserve and its management by the Forest Service gives opportunities which few other sections possess to study the best methods of forest management. The state has twenty-one thousand acres of timber land to be used as a forest and game preserve, on which student help will be largely used. In addition Itasca state park, consisting of 22,000 acres, is used by the Forestry School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forestry School a forest equipment which is unsurpassed anywhere.

Graduate work is offered to those who have sufficient preparation to pursue it to advantage. Two courses are offered but others may be given if conditions seem to make it desirable.

1. FOREST MANAGEMENT AND ECONOMICS — MR. GREEN

A general course in economics as applied to the problem of properly handling forest wealth.

2. WORKING PLANS FOR FORESTS — MR. GREEN

The study and discussion of the working plans in use in foreign countries. Criticism of working plans in the United States.

EXPERIMENTAL ENGINEERING

FOR GRADUATES AND UNDERGRADUATES

1. MATERIALS TESTING LABORATORY — MESSRS KAVANAUGH AND SHOOP
Two credits (lecture and laboratory) — First semester
Required of seniors. Open to those pursuing course M. 7.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

2. STEAM LABORATORY — MESSRS KAVANAUGH AND SHOOP
Two credits (lectures and laboratory) — Second semester
Required of senior E. E. Open to those pursuing course 20 M. E.

Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.

3. HYDRAULIC LABORATORY — MESSRS. KAVANAUGH AND SHOOP
Two credits (lecture and laboratory) — Second semester
Required of senior C. E. Open to those pursuing course M. 8.

Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps and other hydraulic apparatus.

6. EXPERIMENTAL LABORATORY — MR. KAVANAUGH
Three credits — First semester
Required of post senior M. E.; preparation: course 4.

Calibration of dynamometers and measurement of power. Testing lubricating value of oils. Tests of injectors and ejectors. Tests of steam-turbines, steam-engines and boilers, and complete power and lighting plants.

7. EXPERIMENTAL LABORATORY Mr. KAVANAUGH.
Two credits First semester.

Required of post senior E. E. Preparation: courses 8, mathematics and mechanics, and 20 M. E.

Hydraulic measurements. Tests of water motors, rams, steam and power pumps. Measurement of power. Tests of gas and steam engines, boilers and complete power and lighting plants.

8. EXPERIMENTAL LABORATORY Mr. KAVANAUGH
Three credits First semester

Elective for post seniors. Preparation: course 1. Tests of the properties of cements, concrete, and reinforced concrete. Strength of beams, columns, joints and framed structures.

9. GAS ENGINE LABORATORY Mr. KAVANAUGH
Three credits Second semester

Required of post senior M. E. Preparation: courses 21 M. E. and 6 Ex. E A continuation of course 6, also tests of gas, gasoline and hot-air engines, gas producers air compressors, automobile and locomotive testing and special work.

10. EXPERIMENTAL LABORATORY Mr. KAVANAUGH
Two or four credits Second semester

Elective for post seniors. Special research work and commercial tests.

GEOLOGY

FOR UNDERGRADUATES AND GRADUATES

3. INDUSTRIAL GEOGRAPHY Mr. LEHNERTS
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed course 1 or 2.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent, a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

8. PALEONTOLOGY Mr. SARDESON
Six credits (three hours per week) Both semesters

Open to juniors and seniors who have taken or are taking courses in geology or biology.

The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations.

9. PALEONTOLOGIC PRACTICE Mr. SARDESON
Six credits (three hours per week) Both semesters

Open to juniors and seniors who have completed course 8; may be taken by students pursuing courses in geology and biology in conjunction with course 7.

The collection, preparation, and study of materials, examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course 7.

11. PETROGRAPHY Mr. GROUT
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed course 10.

The identification of rocks through the optical study of the component minerals, rock structures as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field, and an examination of some group of Minnesota crystalline rocks are features of the course. Laboratory, lectures, reference reading, and field work.

13. ORE DEPOSITS — MR. HALL

Three credits (three hours per week) — First semester

Open to seniors who have completed geology 1 and mineralogy 1.

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead and zinc.

14. SPECIAL PROBLEMS — MR. HALL

Two credits (two hours per week) — Second semester

Open to seniors who have completed course 1 or 13.

The investigation by individual students of particular problems, involving the field work of an investigation of some particular formation and the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books, and the preparation of geological maps, profiles, and sections will be taught.

FOR GRADUATES

21. PETROGRAPHICAL PROBLEMS — MESSRS. HALL AND GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbro schists of the Minsota river valley or the granites and basic eruptives of central Minnesota.

22. THE KEWEENAWAN ERUPTIVES — MESSRS. HALL AND GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

This course treats first, eastern and northwestern Minnesota, their stratigraphic relations, textural and structural characters; second, other problems in the Keweenawan to be selected on consultation.

23. GLACIAL GEOLOGY — MR. HALL

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of Saint Anthony, the Dalles of the Saint Croix, and other problems. The special field to be selected on consultation.

24. PALEONTOLOGIC GEOLOGY — MR. SARDESON

Three credits (three hours per week)

Open to graduate students who have completed courses 1, 6, and 8.

A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.

25. ADVANCED PALEONTOLOGY — MR. SARDESON

Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course 8.

The study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The class work is to be supplemented by a thesis.

GERMAN

FOR UNDERGRADUATES AND GRADUATES

6. THE DRAMA — MR. SCHLENKER, MRS. WILKIN, MR. JUERGENSEN AND MR. BURKHARD

Six credits (three hours per week) — Both semesters

Open to those who have taken courses 1 and 2, or course 4; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 8.

First semester: Modern drama. Play of Hebbel, Hauptmann, or Sudermann. Study of the present-day drama in Germany. Assigned readings and reports. Second semester: Classic drama. Play of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

9. GERMAN LITERATURE OF THE CLASSIC PERIOD — MR. MOORE

Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1 and 2 (by special permission) or 3 and 7, or 4 and 6; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Goethe's *Faust;* its genesis; the Faust legend; its treatment in literature before and since Goethe's time; plan of Goethe's *Faust;* solution of the Faust problem in part two. Lectures and collateral reading; essays by the class. Schiller's ballads, and other representative poems of this period. German versification. Second semester: Reading and discussion of Lessing's more important critiques, the *Laocoon,* and *Dramaturgie.* Lectures and collateral reading; essays.

10. MODERN AUTHORS — MR. MOORE

Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1, 2, and 9 (by special permission), or 4, 6, and 9, or 3, 7, and 9; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.

First semester: Romantic school and *Junge Deutschland.* Second semester: German literature since 1848.

12. HISTORY AND LITERATURE OF THE REFORMATION — MR. MOORE

Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given for the first semester.

Brandt, Luther, Hutten, Sachs, Murner, and Fischart. Selections from Jansen and Egelhaaf.

13. MIDDLE HIGH GERMAN — MR. SCHLENKER

Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given for the first semester.

Study of the language and literature of the period. Paul's *Mittelhochdeutsche Grammatik.* Selected readings from *Armer Heinrich, Nibelungen Lied, Gudrun,* the poems of Walter von der Vogelweide, *Parsifal,* etc.

17. HISTORY OF GERMAN LITERATURE — MR. JUERGENSEN

Four credits (two hours per week) — Both semesters

Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.

Lectures in German on the history of German literature. Reviews and topical research on the part of the students.

FOR GRADUATES

14. OLD HIGH GERMAN — MR. KLAEBER

Four credits (two hours per week) — Both semesters

Open to seniors who have taken course 9 or course 10; both semesters must be completed before credit is given for the first semester.

This course is identical with comparative philology 11.

15. SEMINAR IN GERMAN DRAMA — MR. SCHLENKER

Two credits (one hour per week) — Both semesters

Open to graduates and by permission of the department to undergraduates but without credit.

An outline of the history of German dramatic literature from its beginning to and including the so-called classic drama. Assigned readings, reports, and discussions.

16. THE GERMAN VOLKSLIED — MR. WILLIAMS

Two credits (two hours per week) — Second semester

Open to graduate students who have completed course 9 or course 10.

Outline of the history and development of the *Volkslied*. Study of selected numbers in Uhland's *Volkslieder* with reference to other general and special collections. Influence of the Volkslied upon lyric and ballad writers.

18. SEMINAR IN SCIENTIFIC READING — MR. JUERGENSEN

Four credits (two hours per week) — Both semesters

Open to graduate students who have completed course 9 or 10, and (by permission of the department) to undergraduates who have completed course 9 or 10; both semesters must be completed before credit is given for the first semester.

1908-9	The literature of evolution (Haeckel, Reinke, etc.)
1909-10	Chemistry and physics (Ostwald, Helmholtz, etc.)
1910-11	Psychology and philosophy (especially Wundt.)

For courses in Germanic philology see the statement of the department of comparative philology.

GREEK

FOR GRADUATES

18. SEMINAR IN GREEK TRAGEDY — MR. BROOKS

One credit (one hour per week) — Second semester

Open to juniors and seniors who have completed course 5.

19. ADVANCED COURSE IN EPIC POETRY — MR. HUTCHINSON

Open to graduate students only; other arrangements may be ascertained upon application to the department.

20. ADVANCED COURSE IN GREEK DRAMATIC POETRY — MR. BROOKS

Open to graduate students only; other arrangements may be ascertained upon application to the department.

21. ADVANCED COURSE IN GREEK ORATORY — MR. SAVAGE

Open to graduate students only; other arrangements may be ascertained upon application to the department.

22. LATER GREEK (322 B. C. to 200 A. D.) MR. HUTCHINSON
Open to graduate students only; other arrangements may be ascertained upon application to the department.

HISTORY

FACILITIES

The department of history is equipped with library material for "practice courses" in research in American History, especially the colonial and revolutionary periods, in English and French medieval history, in the French Revolution, and in certain phases of European Nineteenth Century history. Valuable additions to the University resources in some of these lines are to be found in the excellent library of the State Historical Society, and in the State Library at the Capitol in St. Paul (thirty minutes distant), and in the City and Athenaeum libraries in Minneapolis.

In none of the lines mentioned, however, is the department satisfactorily prepared to give more than two years of graduate work, with due regard for economy of the student's time and energy. Therefore, if a student desires to take his doctorate in history here, he must be prepared, until the library facilities are materially improved, to do at least a third of his work in libraries elsewhere, under direction of the department.

COURSES OF INSTRUCTION

The following are "general courses" (lectures and reading, with study of selected documents and some research work). They are open to upper classmen in the undergraduate college who have completed one or two elementary courses there; and they may be taken as minors, or parts of minors, for the master's degree. Any one of them may be taken, also, for part of a major towards the master's degree. provided, (1) that the applicant has made large general preparation in other fields of history, and, (2) that the course chosen be accompanied by sufficient work in more intensive courses in the same field. Thus if an applicant is well prepared in European history, including English constitutional history, but has had little American history, he might be allowed a major in 5 followed by two, three, or four courses selected from 7-14.

FOR UNDERGRADUATES AND GRADUATES

3. THE RENAISSANCE AND REFORMATION MR. WHITE
Three credits (three hours per week) First semester
Open to those who have completed course 1 or course 2.

The Renaissance and Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. EUROPE SINCE 1789 MR. ANDERSON
Six credits (three hours per week) Both semesters
Open to those who have completed course 1 or 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states. The entire class meets twice each week for lectures or recitations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions and other Select Documents Illustrative of the History of France* 1789-1901. This work is done in small groups which meet in the European history seminar room.

5. AMERICAN CONSTITUTIONAL HISTORY TO 1840 MR. WEST

Six credits (three hours per week) Both semesters

Open to those who have completed course 2; required for courses 6 to 9 inclusive, 11, 13, 14, and 19, and therefore to students who intend to specialize in history recommended for the sophomore year.

The aim is to make this a "practice course"; the work is done partly by cooperative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885 MR. WEST

Three credits (three hours per week) Second semester

Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-9, and in alternate years thereafter.

Special attention is given to the development of the slavery issue in politics, the political history of the civil war, and reconstruction.

15. HISTORICAL METHOD AND BIBLIOGRAPHY MR. WHITE

Two credits (two hours per week) Second semester

Open to those who have completed course 1 or course 2, but designed only for those who intend to specialize in history.

This course aims to make clear to the student the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.

2. History of historical writings; especially the work of Ranke and his followers and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.

3. Bibliography. Purpose, to gain a working knowledge of existing helps to historical study, such as standard bibliographies, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

20. ENGLAND SINCE 1815 MR. ANDERSON

Three credits (three hours per week) Second semester

Open to those who have completed course 2; may be taken to advantage in connection with course 4.

The course opens with a rapid survey from the point where course 1 stops down to 1815. From there on the work is more intensive. Through topics and assigned readings an opportunity is afforded to become acquainted with the principal British reviews and with two or three of the leading British newspapers.

21. HISTORY OF GREECE MR. DAVIS

Three credits (three hours per week) First semester

Open to those who have completed course 1 or course 2.

The course is general in its nature and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire, with particular emphasis upon the later part of the period. Especial attention will be given to the permanent influence of Greek civilization.

FOR GRADUATES

The following courses are "intensive" or "advanced" courses. Each one of them requires the completion of the corresponding "general" course in the list above. They may be taken, in proper combination, for majors for the master's degree, or, by ones or twos, for minors.

7. THE MAKING OF THE CONSTITUTION — MR. WEST
Six credits (three hours per week) — Both semesters

Open to juniors, seniors, and graduates, who have completed course 5, but only on approval of the instructor; both semesters must be completed before credit is given for the first semester.

Each member of the class studies in detail the transition in one of the original American colonies to commonwealth government, with the constitution of his chosen state. The work of the Philadelphia convention is then taken up and the accounts of later writers are compared with the sources. "We the people," the "compact" theory, and the province of the Supreme Court as "final arbiter," are topics especially investigated, with such further aids as the writings of the day and the discussions of the ratifying state conventions afford. Besides the class work each student will present a written report upon the history of some important bill providing for the admission of a state, and some constitutional question in connection with congressional legislation.

8. AMERICAN HISTORY SINCE 1789 AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW — MR. WEST
Three credits (three hours per week) — First semester

Open to seniors and graduate students who have completed courses 2, 5, 6, and 7; not given in 1908-9.

This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from *Thayer's Cases on Constitutional Law*, studied in their historical setting and with reference to the course of development.

9. STUDIES IN AMERICAN STATESMEN — MR. ANDERSON
Three credits (three hours per week) — Second semester

Open to juniors, seniors, and graduate students, who have completed course 2 and at least the first semester of course 5.

A research course. Each member of the class makes a study of some prominent American statesman who has left a considerable body of materials valuable for information upon his own career and the general history of the United States. The greater part of the work consists in the sifting of these materials and the preparation of brief reports in regard to points assigned for investigation. The class exercises are chiefly devoted to the criticism of these reports and the synthesis of the results thus obtained. Only a limited period is traversed. In 1909-10 the work will be confined to the period of the Federalist supremacy, 1789-1801.

10. A CRITICAL STUDY OF A HISTORICAL MASTERPIECE — MR. ANDERSON
Three credits (three hours per week) — First semester

Open to those who have completed course 5.

The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Each student will be required to read critically the entire work studied and, in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussions carried on by the students under the direction of the instructor. In 1909-10 Rhode's *History of the United States from the Compromise of* 1850 *to the Restoration of Home Rule in the South in* 1877 will be read.

11. THE HISTORY OF AMERICAN DIPLOMACY — MR. ANDERSON

Three credits (three hours per week) First semester

Open to seniors and graduates who have completed course 5.

A research course dealing principally with the more important features of American foreign policy during the earlier years of the federal government.

12. THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789 MR. ANDERSON

Three credits (three hours per week) Second semester

Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

This course centers about the critical reading of the principal treaties and numerous state papers dealing with international relations.

13. COLONIAL EXPANSION AND ADMINISTRATION MR. WEST

Three credits (three hours per week) Second semester

Open to seniors and graduates who have completed course 4 or course 5; given in alternate years; not offered in 1909-10.

The history of the colonial acquisitions of the great nations will be surveyed rapidly and colonial institutions and governments will be studied and compared in detail.

14. A CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY MR. WEST

Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed eighteen credits, including course 5; both semesters must be completed before credit is given for the first semester; given in alternate years.

This is primarily a course in historical criticism, based on a minute study of Winthrop's *History of New England*. Each member of the seminar has a group of secondary authorities assigned him which he is to criticise in the light of the original sources. The study involves also a careful comparison of the chief sources with one another, and incidentally it leads to a minute treatment of political, social, and economic development in early New England. The number admitted to the course is limited to seven.

18. ORIGIN OF THE ENGLISH JUDICIAL SYSTEM MR. WHITE

Three credits (three hours per week) Second semester

Open to juniors, seniors, and graduates, who have completed six credits, including course 2, and obtain the permission of the instructor; students must be able to read medieval Latin, and course 9 in the Latin department is recommended to give this preparation.

The work will consist of detailed study in the sources of the twelfth and thirteenth centuries, and will aim to show how the king's court, from which the present judicial system has grown, superseded the older communal and private courts, the development of the primitiye king's court into a system of courts, and the growth in it of a new procedure. In this last connection the critical stages in the early history of the jury will receive special attention.

19. ENGLISH INSTITUTIONAL DEVELOPMENT IN THE SEVENTEENTH CENTURY MR. NOTESTEIN

Three credits (three hours per week) Second semester

Open to juniors, seniors and graduates who have completed twelve credits in history, including course 2.

22. GREEK POLITICAL INSTITUTIONS MR. DAVIS

Three credits (three hours per week) Second semester

Open to juniors, seniors, and graduates, who have completed courses 1 or 2, 21, and six additional credits.

A study of the development of Greek political forms and of their operation as seen in typical oligarchic, democratic, federal, and monarchic states.

23. **Roman Imperial Organization** **Mr. Davis**
Three credits (three hours per week) Second semester

Open to juniors, seniors, and graduates, who have completed twelve credits.

This course will survey the development and organization of the imperial system from the beginning of Roman expansion outside of Italy to the time of the Germanic invasion. Special attention will be given to the administration of the municipalities and provinces under the Empire and to the development of despotism.

HORTICULTURE

Equipment. The library of the division of horticulture is well equipped with literature and periodicals devoted to this subject, all of which are well indexed. The campus, orchards, nurseries, fruit gardens and greenhouses at the University farm afford good illustrations and opportunities for study and experiment work. The new fruit breeding farm offers the best of facilities for the study of this important line of work.

Graduate work is offered to those who are prepared to pursue it to advantage. Two courses are offered but others will be given if conditions seem to make it desirable.

1. **General Pomology** **Mr. Green**

A general course in the study of cultivated fruits.

2. **Plant Breeding** **Mr. Green**

A general course in the study of the origin and development of cultivated varieties.

LATIN

FOR UNDERGRADUATES AND GRADUATES

6. **Advanced course in Caesar** **Mr. Pike**
Three credits (three hours per week) First semester

Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.

Selections from books five to seven of the Gallic War and from the Civil War. Thorough study of the principles of indirect discourse. Intermediate Latin composition. An amount of time approximately equal to one hour for one-half semester will be spent upon the technical portions of the work, e. g., class drill work and discussion of various problems connected with secondary school work in Latin.

7. **Advanced course in Virgil** **Mr. Pike**
Three credits (three hours per week) Second semester

Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.

An interpretation of selections from books seven and twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical reading of selected passages. An amount of time approximately equal to one hour for one-half semester will be spent upon the strictly technical portions of the subject.

8. **Pliny's Letters** **Mr. Pike**
Two credits (two hours per week) First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from the correspondence of Pliny the Younger with a study of his times.

10. **Latin Composition** **Mr. Pike**
Two credits (two hours per week) Second semester

Open to those who have completed courses 1 to 4 inclusive.

A course in advanced Latin composition and a study of Latin prose style.

11. ROMAN ELEGIAC POETRY — MR. CLARK

Three credits (three hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from Catullus, Tibullus, Propertius, and Ovid, with a study of the rise, development, and characteristics of Roman elegiac poetry,

12. CORRESPONDENCE OF CICERO — MR. CLARK

Two credits (two hours per week) — First semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from the letters of Cicero, with a study of his life and the history of his times.

13. ROMAN SATIRE — MR. CLARK

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 to 4 inclusive.

Selections from Juvenal, Persius, Horace, and from early satire, with a study of the rise, development, and characteristics of Roman satire.

Courses 6 and 7 are open as minors only on permission of the professor in charge.

FOR GRADUATES

17. LUCRETIUS — MR. CLARK

Three credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The course consists of the reading and interpretation of the text of Lucretius with a study of his philosophy and its sources.

18. SENECA — MR. PIKE

Three credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Reading, interpretation and annotation of the *de Beneficiis* of Seneca with study of Stoicism at Rome.

19. THE HISTORY AND THEORY OF ROMAN ELOQUENCE — MR. GRANRUD

Two credits (two hours per week) — Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Cicero's *De Oratore* will form the basis of the work.

LAW

FIRST GRADUATE COURSE

1. PHILOSOPHIC BASIS OF JURISPRUDENCE — MR. PATTEE

For the degree of Master of Laws. This course constitutes an inquiry into the nature of law in its most general signification. It considers the truths of reason, the "laws of nature," so-called, and the positive law or jurisprudence. It considers the nature of international and municipal law, and illustrates by means of judicial authorities how the primary truths of reason operate in the realm of human law.

2. SCIENCE OF THE STATE

This course considers the segregation from the comprehending science of politics, and the co-ordinate sciences of government and jurisprudence. The citizen and subject population; the territory, its existence and content, subdivisions, relation of people to the land, comparison of great and small states; theories of the state liberty and opportunity as the ends of the state; the state as the organ of power, and guardian of rights; the essentia of constitutions.

3. Constitutional History and Jurisprudence.

This course is devoted to a critical study of the "dual system" of constitutional government of which the American Republic is the conspicuous example. The Federal constitution and the State constitutions are illustrated separately in both their historical and their legal aspects, as distinct parts of one system, but designed to work harmoniously in unison, and both necessary to the successful operation of the system. The Federal courts are shown to have so conducted the administration of their high duties as to have contributed to the proper development of the State side of the system, and to have made the Federal Government the firm bulwark of local self-government in the States.

Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other law college having a three years' course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws.

But no graduate of another law school, who has not been admitted to the bar of Minnesota, will be matriculated in this course as a regular student for the degree of LL. M.; but any person who possesses the requisite legal learning may enter the course as a special student and pursue any or all of the studies offered.

SECOND GRADUATE COURSE

Students who have received the degree of LL. B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL. M., from this or some other school after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to candidacy for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis for the doctor's degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the current academic year will depend upon the number of applicants for admission.

MATHEMATICS

FOR UNDERGRADUATES AND GRADUATES

13. Differential Equations — Mr. Downey
Three credits (three hours per week) — Second semester
Open to those who have completed courses 3 to 7 inclusive.
Text and lectures.

11. Advanced Course in Plane Analytical Geometry — Mr. Bauer
Three credits (three hours per week) — First semester
Open to those who have completed courses 3 to 6 inclusive.

Supplementary to course 5, treating more fully some of the subjects of that course and taking up additional subjects.

12. Solid Analytical Geometry — Mr. Bauer

Three credits (three hours per week) Second semester

Open to those who have completed courses 3 to 8 inclusive.

A lecture course. Elementary theorems of projection, co-ordinates, the plane, the line in space, quadric surfaces, transformation of co-ordinates, tangents, poles and polars, the general equation of the second degree. Numerous examples are assigned to illustrate the theory.

15. METHOD OF LEAST SQUARES MR. LEAVENWORTH

Two credits (two hours per week) Second semester

Open to those who have completed courses 3 to 7 inclusive.

A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering physics, and astronomy.

17. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS MR. DOWNEY

Four credits (two hours per week) Both semesters

Open to graduate students who have completed courses 3 to 7 inclusive.

This course goes farther into some of the subjects treated in courses 6 and 7 and takes up some important subjects not included in those courses.

18. MODERN GEOMETRY MR. BAUER

Four credits (two hours per week) Both semesters

Open to graduate students who have completed courses 3 to 7 inclusive and 10 and 12.

This is a course in differential geometry. The fundamental equations of the theory of curves and of surfaces will be developed. The work will be based upon Scheffer's *Theorie der Curven* and *Flaechen.*

18. THEORY OF NUMBERS MR. BUSSEY

Four credits (two hours per week) Both semesters

Open to graduate students who have completed courses 3 to 9 inclusive.

20. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE MR. DALAKER

Four credits (two hours per week) Both semesters

Open to graduate students who have completed courses 1 to 10 inclusive

Lectures, readings, and problems.

21. PROJECTIVE GEOMETRY MR. BUSSEY

Four credits (two hours per week) Both semesters

Open to graduate students who have completed courses 3 to 7 inclusive and courses 11 and 12.

MATHEMATICS AND MECHANICS

FOR GRADUATES AND UNDERGRADUATES

DESCRIPTIVE GEOMETRY MR. KIRCHNER

Four credits (two hours per week) Both semesters

Open to those who have completed courses in drawing 3 to 5 inclusive; both semesters must be completed before credit is given for the first semester.

Problems relating to points, lines, planes, solids, surfaces of revolution and warped surfaces; orthographic, isometric, horizontal, oblique, and perspective projections; shades and shadows. Recitations, lectures, and practice.

7. STRENGTH AND RESISTANCE OF MATERIALS MR. EDDY

Five credits (five hours per week)

Required of all juniors in the civil engineering course. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics of the two preceding years. Bars, beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, and plates and the general theory of internal stress.

7a. Applied Mechanics Messrs. Brooke and Newkirk
Five credits (five hours per week) First semester

Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as for course 7. The principles of statics and dynamics, and the mechanics of the materials of construction.

8'. Hydraulics and Pumping Machinery Messrs. Eddy, Brooke and Newkirk
Five credits (five hours per week) Second semester

Required of all juniors. Prerequisite, course 7 or 7a. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

9. Thermodynamics of Steam and Gas Engines Mr. Eddy
Three credits (three hours per week) First semester

Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8'. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including the use of steam tables, entropy diagrams, etc.

10'. Water Turbines Mr. Eddy
Two credits (two hours per week) First semester

Required for all candidates for degrees in mechanical and electrical engineering, except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.

11'. Steam Turbines Mr. Eddy
Two credits (two hours per week) Second semester

Open to all who have had courses 9 and 10. Various types of turbines, velocity, impulse and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.

12. Refrigerating Machinery Mr. Eddy
Two credits (two hours per week) Second semester

FOR GRADUATES

26. Perspective Mr. Kirchner
Three credits (three times per week)

The principles and practice of perspective, including shadows, reflections, distortions, corrections, systems, methods, the practical problem, and inverse constructions.

27. History of Mathematics Mr. Haynes
Two credits (twice per week)

Lectures and reading, under direction of works in the mathematical library on the ancient and modern development of mathematics.

28. Elliptic Integrals Mr. Brooke
Four credits (two hours per week) Both semesters

Courses in the following related subjects in mathematics, mathematical physics and theoretical mechanics are open to those who have had sufficient preparation. Consult the head of this department.

13. Differential Equations.
14. Analytical Statics and Potential Functions.
15. Spherical Harmonics.
16. Theory of Electricity and Magnetism.
17. Analytical Theory of the Conduction of Heat.
18. Theory of Elasticity and Sound.
19. Electro-Magnetic Theory of Light.
20. Hydrodynamics and Fluid Motion.
21. Dynamics of Rigid Bodies.

22 Elliptic Functions.
23. Theory of Functions of the Complex Variable.
24. Directional Calculus, Vector Analysis, Determinants.
25. Kinetic Theory of Gases.

MECHANICAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

9. Shop Economics — Mr. Flather
Two credits (two hours per week) — Second semester
Senior elective.
Shop and factory organization and management; cost systems.

13. Machine Design — Messrs. Flather and Martenis
Five credits (ten hours per week) — First semester
Required of seniors. M. E. and E. E. courses. Open only to students pursuing course M. 7.
Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures and drawing-room practice.

14. Machine Design — Messrs. Flather and Martenis
Three credits (six hours per week) — Second semester
Required of seniors, M. E. course. Open only to those pursuing course 20.
Continuation of course 13. Rope driving; bevel gears, spiral gears. Also application of graphical methods to the design of valve gears and link motions. Zeuner diagrams, indicator cards. Lectures and drawing-room practice.

15. Machine Design — Mr. Flather
Four credits (eight hours per week) — First semester
Required post senior year, M. E. course. Preparation: courses 14 and 19.
Steam engine. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details.
Gas engine. An alternative course in gas engine design is offered those who have completed course 21.

16. Machine Design — Mr. Flather
Four credits (eight hours per week) — Second semester
Required, post senior year, M. E. course. Preparation: course 13.
Original designing, including machinery for changing size and form. Boiler design, cranes, pumping and transmission machinery and engineering appliances. Lectures, problems and drawing-room practice.

17. Tool Design — Mr. Flather
Two to four credits (four or eight hours per week) — First or second semester
Elective. Preparation: courses 6, 13.
Design of special tools for manufacturing interchangeable parts; jigs and milling fixtures.

18. Engineering Design — Mr. Flather
Two or four credits (four or eight hours per week) — First or second semester
Elective. Preparation: courses 19, 20.
Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer gas plants; choice of engines and boilers; water powers; power distribution, dynamos and motors; pumps, shafting, piping and accessory plant.

19. Steam Boilers — Mr. Shoo
One credit (one hour per week) — First semester
Senior year. Open only to students pursuing course M. 7.
Application of theory and practice in the design and construction of steam

boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

20. STEAM ENGINE — MR. FLATHER
Three credits (three hours per week) — Second semester
Senior year, preparation: course 7 M.

Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines, valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

21. GAS ENGINES AND PRODUCERS — MR. SHOOP
Two credits (two hours per week) — Second semester
Senior year. Open only to students pursuing course C. 6.

Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.

A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

22. MECHANICAL ENGINEERING — MR. FLATHER
Two credits (two hours per week) — First semester
Post senior, preparation: course 8 M.

MEASUREMENT OF POWER. A study of the methods employed in measuring power. Dynamometers. Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors, power required to drive machine tools and shafting. Recitations and lectures.

Two credits (two hours per week) — Second semester
Preparation; course M. 8.

Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. MECHANICAL ENGINEERING — MR. MARTENIS
Three credits (six hours per week) — First semester
Elective. Post senior year.

Heating and ventilation. Principles of heating and ventilation.

Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum and fan systems. Lectures, recitations and design.

SEMINAR. Open to the seniors and post seniors once a week.

The following courses are available to students desiring to prepare themselves for special work in railway engineering.

24. RAILWAY TECHNOLOGY — MR. MARTENIS
Two credits (four hours per week) — First semester
Post senior. Railway M. E. course.

The object of this course is to familiarize the student with the principal details of construction of locomotives, and consists in part of a systematic course of visits to the various railroad shops in the vicinity; lectures and recitations.

25. RAILWAY DESIGN — MR. FLATHER
Four credits (eight hours per week) — First and second semesters
Post senior. Preparation: course 24.

(a) Of link and valve motions. Continuation of course 12 with special applications of the Stephenson link.

(b) Of locomotive and car details.

(c) Of the locomotive boiler.

(d) Of assembled parts.

26. LOCOMOTIVE CONSTRUCTION MR. FLATHER
Two credits (two hours per week) Second semester
Post senior. Preparation: course 24.

Lectures, reading and recitations on design and construction of locomotives, supplementing course 24. This treats:

(a) Of parts not involving the boiler and the use of steam; but including the carriage, as frames, springs and equalizing arrangements, running gear, brakes, trucks, lubrication.

(b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks, riveted joints, bracing and staying. Lagging, smoke prevention.

(c) Of the locomotive engine. Details, heat insulation, cylinder proportion for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.

27. LOCOMOTIVE ROAD TESTING MR. FLATHER
Second semester
Post senior.

28. SPECIFICATIONS MR. FLATHER
One credit (one hour per week) Second semester
Post senior year, M. E. course.

A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications.

FOR GRADUATES

Courses are offered in:
Engineering design.
Experimental investigation.
Railway engineering.

MINERALOGY

FOR UNDERGRADUATES AND GRADUATES

4. OPTICAL MINERALOGY MR. GROUT
Three credits (six hours per week) Second semester
Open to juniors and seniors who have completed course 1.

A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

5. THE MORPHOLOGY OF MINERALS MR. GROUT
Three credits (three hours per week) First semester
Open to juniors and seniors.

A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.

6. PHYSIO-CHEMICAL METHODS WITH THEIR APPLICATIONS MR. GROUT
Three credits (three hours per week) Second semester

Open to seniors.

The method of micro-chemical analysis described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-minerals.

7. AN OUTLINE OF MINERALOGY MR. GROUT

Two credits (one hour per week) Both semesters

Open to juniors and seniors.

A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.

FOR GRADUATES

8. ORIGINAL PROBLEMS IN MORPHOLOGICAL AND PHYSICAL MINERALOGY MESSRS. HALL AND GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Investigations in mathematical crystallography and its application to crystal development and structure. Further application than is made in course 4 of the optical characters of minerals in identification of mineral species.

9. SPECIAL INVESTIGATIONS IN CHEMICAL AND PHYSICAL MINERALOGY MR. GROUT

Open to graduate students; other arrangements may be ascertained upon application to the department.

Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.

10. MINERAL OCCURRENCES AND ASSOCIATION MESSRS. HALL AND GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A discussion of genetic relationships. Field work in connection with the different phases of the particular problem in hand.

The equipment of the department of geology and mineralogy is sufficient for many lines of graduate work. The department has collected from many localities, both within and without the state, and the Geological Survey has made extensive collections during the years of its active field work. The material thus gathered, the published literature on the state and the field within easy access from the University afford suggestions of unsolved problems in a number of different geological lines.

PATHOLOGY AND BACTERIOLOGY

The present courses in general pathology and bacteriology for medical and engineering students are offered as minors for Ph. D. and as majors for the master's degree.

A major for the Ph. D. shall consist of research in pathology for medical or experimental medicine, prerequisite to which certain of the regular courses offered in this department must be satisfactorily completed.

Before entrance into any course offered in this department, a working knowledge of certain groups of subjects such as histology and embryology, animal biology, anatomy, physiology, botany, chemistry, physics, etc., must be had.

1. GENERAL BACTERIOLOGY MESSRS. WESBROOK, HILL AND FIDLAR

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria will be dealt with. The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media will be studied until a thorough knowledge of technique is acquired. General and special studies of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, will be thoroughly carried out. Testing of various germicides—chemical and physical—and the use of bacteriological methods in the examination of drinking water will form an important part of the work. Bacterial activities concerned in sewage purification, etc., will receive attention. Twenty hours per week during the last eight weeks of the second semester, second year.

2. GENERAL PATHOLOGY MESSRS. WESBROOK, MULLIN AND ROBERTSON

Twenty hours per week during the last eight weeks of the second semester, second year.

Lectures, demonstrations and laboratory work on the general processes involved in disease to include the study of inflammation, the degenerations and tumors.

PHARMACY

THE GRADUATE COURSE IN THE COLLEGE OF PHARMACY

In addition to its regular undergraduate course this college offers two graduate courses, the first continuing through one college year and leading to the degree of "master of pharmacy," and the second continuing through an additional year or longer, and leading to the degree of "doctor of pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. It is intended that the curriculum shall include higher pharmaceutical chemistry, pharmaceutical assaying, higher organic chemistry, proximate and ultimate analysis, chemistry of food, spectroscopic work, therapeutics, and bacteriology, and a thesis of at least 3,000 words, embodying the results of original work, but this curriculum may be changed by the faculty if occasion or experience require.

The requirements for admission are a diploma from a Minnesota high school of the first grade, or an equivalent; a diploma from a college of pharmacy whose curriculum, extent and kind of work and length of undergraduate course are equal to those of the undergraduate work of this college; an acquaintance with either German or French sufficient to enable the student to read and understand the scientific literature of those languages, and a certificate of registration as pharmacist from any state board of pharmacy. The fees for this course will be seventy-five dollars, and, upon graduation, an additional fee of ten dollars for diploma. The rules relating to damage, waste and breakage in laboratories are the same as those applying to the undergraduate course.

The course leading to the doctor's degree will begin as soon as there are sufficient applicants.

PHILOSOPHY AND PSYCHOLOGY

FOR UNDERGRADUATES AND GRADUATES

3. EDUCATIONAL PSYCHOLOGY MESSRS. MINER AND HAYNES

Three credits (three hours per week) Second semester

Open to those who have completed course 1.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. EXPERIMENTAL PSYCHOLOGY: The Senses MESSRS. MINER AND HAYNES
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed course 1. As the number in each laboratory section will be limited, students should arrange with the instructor for their section before registration.

This course, together with course 5, is designed to give a general survey of experimental methods and results as well as a training for laboratory research in psychology. The work involves typical experiments on sensation and movement. One hour of class discussion and two double hour laboratory periods are required.

5. EXPERIMENTAL PSYCHOLOGY: Higher Mental Processes MR. MINER
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed courses 1 and 4.

A continuation of course 4 with experiments on affection, memory, attention, and such other processes as can be studied by laboratory methods. The quantitative phase of experimental psychology is taken up for special discussion.

6. OUTLINE OF EXPERIMENTAL PSYCHOLOGY MR. MINER
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed course 1; not given in 1909-10.

A study of the methods and accredited results of experimental investigation in psychology. Class-room demonstrations, lectures, and discussions.

7. PSYCHOLOGICAL INTERPRETATION MR. MINER
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed course 1.

Unusual and pathological mental states are studied for the light they throw upon normal mental life. The student is given drill in the detecting of mental defects and in the psychological explanation of characters in history and literature. The subconscious, dreams, suggestibility, telepathy, nervous disorders, insanity, secondary personalities, and the crowd are among the topics treated.

8. PSYCHOLOGICAL PRINCIPLES MR. SWENSON
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed courses 1 and 2.

An advanced course treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

9. ANCIENT AND MEDIAEVAL PHILOSOPHY MR. WILDE
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed course 1 or course 2.

This and the following course are designed to give such an outline of the history of thought as is desirable in a general education. Emphasis is placed upon the human significance of philosophy rather than upon its purely technical aspect. In the first semester the main work will be upon the philosophies of Plato and Aristotle, but the later development will be traced as far as the Renaissance—

10. MODERN PHILOSOPHY MR. WILDE
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed course 1 or course 2.

Lectures on the representative systems of modern philosophy from the Renaissance to our own day, the purpose of the course being to prepare the student to understand the philosophical tendencies of the present. The work will include a study of Bacon, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant, Mill, Schopenhauer.

11. PRINCIPLES OF ETHICS MR. WILDE
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed course 1 or course 2.

An introductory course, comprising a study of the distinction between moral and non-moral phenomena, an analysis of voluntary conduct, and a discussion of the nature of conscience, the meaning of right and wrong, the purpose of life, human responsibility, and the authority of moral law..

12. PHILOSOPHY OF RELIGION — MR. WILDE

Three credits (three hours per week) — Second semester

Open to juniors and seniors who have completed course 1 or course 2.

A study of the religious consciousness, its origin, development and significance; an analysis of the conception of God and a discussion of the place and function of religion in modern life.

ADVANCED INTENSIVE COURSES

14. LOGIC OF SCIENCE — MR. SWENSON

Three credits three hours per week) — Second semester

Open to juniors and seniors who have completed course 2.

This course serves as an introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relations of their fundamental principles.

FOR GRADUATES

Courses from the following list will be offered to graduates each year as determined by the needs and qualifications of the students presenting themselves. It is desirable that the students consult with the department as early in the session as possible in order that the course and hours may be arranged to suit the greatest number.

16. PSYCHOLOGICAL PROBLEMS — MR. MINER

Both semesters

Open to seniors and graduate students who have completed courses 1, 4 and 5; other arrangements may be ascertained upon application to the department.

Original work on special topics.

17. RESEARCH IN PSYCHOLOGY — MR. MINER

Six credits (three hours per week) — Both semesters

Open to graduate students who have completed course 14; both semesters must be taken before credit is given for the first semester.

Minor or major research in experimental, educational, analytic, genetic, or comparative psychology.

18. THE PHILOSOPHY OF DESCARTES, SPINOZA, AND LEIBNITZ — MR. SWENSON

Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.

A study of the pre-critical period of modern philosophy. The work will center in the discussion of the *Ethics* of Spinoza and *Monadology* of Leibnitz.

19. THE PHILOSOPHY OF KANT — MR. SWENSON

Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 1, 2, 9. and 10; both semesters must be completed before credit is given for the first semester.

A critical reading of the three Critiques; the relation of Kant to the development of modern philosophy.

10. THE PHILOSOPHY OF HUME — MR. SWENSON

Six credits (three hours per week) — Both semesters

Open to seniors and graduates who have completed courses 1, 2, 9, and 10 both semesters must be completed before credit is given for the first semester.

A critical reading of Hume's philosophical works; the position of Hume in the development of English philosophy.

21. PSYCHOLOGICAL PRINCIPLES — MR. SWENSON

Three credits (three hours per week) — First semester

Open to juniors and seniors who have completed courses 1 and 2.

An advanced course, treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

22. METAPHYSICS — MR. SWENSON

Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed course 9 and course 10 or 11; both semesters must be completed before credit is given for the first semester.

A critical and constructive discussion of theories of knowledge and reality.

23. SYSTEMATIC ETHICS — MR. WILDE

Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10, and 11; both semesters must be completed before credit is given for the first semester.

A detailed study of the principles of conduct and the basis of moral obligation.

24. HISTORY OF ETHICS — MR. WILDE

Six credits (three hours per week) — Both semesters

Open to seniors and graduate students who have completed courses 9, 10, and 11; both semesters must be completed before credit is given for the first semester.

A critical study of the development of Greek, English, and German ethical thought. Chief attention will be paid to the work of Plato and Aristotle in ancient times, and to the relation between utilitarianism and idealism in modern philosophy.

25. GERMAN IDEALISM — MR. WILDE

Six credits (three hours per week) — Both semesters

Open to graduate students who have completed courses 9, 10, and 17; both semesters must be completed before credit is given for the first semester; a knowledge of German is required.

A study of the development of German philosophy after Kant especially as found in the writings of Fichte and Hegel.

PHYSICS

FOR UNDERGRADUATES AND GRADUATES

5. MECHANICS OF SOLIDS AND FLUIDS — MESSRS. J. ZELENY, A. ZELENY, ERIKSON AND KOVARIK

First semester

Four credits (three recitations and one lecture or two hours laboratory)

Open to sophomores, juniors and seniors who have completed mathematics 4 or 2 (Trigonometry)

The laboratory fee is two dollars.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures.

6. HEAT, MAGNETISM AND ELECTROSTATICS — MESSRS. J. ZELENY, A. ZELENY, ERIKSON AND KOVARIK

Four credits (one lecture, two recitations and two hours laboratory)

Second semester

Open to those who have completed course 5.

The laboratory fee is three dollars.

The fundamental principles of the subjects are studied mainly from the experimental side. The laboratory work consists of the measurements of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

7. ELECTROKINETICS, MESSRS. J. ZELENY, A. ZELENY, ERIKSON AND KOVARIK

Four credits (one lecture, two recitations and two hours laboratory) First semester

Open to those who have completed course 6. The laboratory fee is three dollars.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

8. SOUND AND LIGHT MESSRS. J. ZELENY, ERIKSON AND KOVARIK

Four credits, (one lecture, two recitations and two hours laboratory) Second semester

Open to those who have completed course 5. The laboratory fee is three dollars.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight into some of the relations which obtain in the subjects.

9. ADVANCED ELECTRICAL MEASUREMENTS MR. A. ZELENY

One credit (two hours per week) Second semester

Open to those who have completed course 7.

The laboratory fee is three dollars.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities

10. PHYSICAL MANIPULATION AND LABORATORY TECHNIQUE MR. JOHN ZELENY

Three credits (six hours per week) Second semester

Open to juniors and seniors who have completed courses 5 and 6: The laboratory fee is three dollars. This course is especially useful to those who intend to teach the science or to specialize in it.

The object of the course is to give the student a knowledge of the essential physical manipulations (such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc.), and to acquaint him with the use of some instruments of precision (such as the cathetometer, the dividing engine, the balance, mercury air pumps and gauges, etc.)

11. DYNAMICS MR. ERICKSON

Three credits (three hours per week) First semester

Open to juniors and seniors who have completed courses 5 and 6, and mathematics 9 and 10 (calculus).

A discussion of some problems in dynamics which are important in the study of advanced physics.

12. ADVANCED PHYSICAL MEASUREMENTS MR. JOHN ZELENY

Three credits (six hours per week) First or second semester

Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is three dollars.

The course consists of individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

13. ADVANCED PHYSICAL MEASUREMENTS — MR. JOHN ZELENY
Six credits (twelve hours per week) — First or second semester

Open to juniors, seniors and graduate students who have completed courses 5 and 6. The laboratory fee is five dollars.

The same as course 10 except that twice as much time is devoted to the subject.

FOR GRADUATES

14. THE THEORY OF LIGHT — MR. JOHN ZELENY
Three credits (three hours per week) — Second semester

Open to graduate students who have completed course 8 and mathematics 9 and 10 (calculus).

A study of the important optical phenomena. Preston's *Theory of Light* is used as a text.

15. ELECTRICAL MEASUREMENTS OF PRECISION — MR. ANTHONY ZELENY
Three credits (six hours per week) — Second semester

Open to seniors and graduate students who have completed course 7. The laboratory fee is three dollars. The course is intended for electrical engineering and scientific students who desire to specialize in electrical work of the highest precision

The course is chiefly experimental and includes the following: making of standard cells; calibration of Wheatstone box bridge; adjustment of resistances, ammeters, and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance, and magnetic flux; measurement of temperatures by electrical methods.

16. RADIO-ACTIVITY — MR. KOVARIK
Three credits (three hours per week) — Second semester

Open to graduate students who have completed courses 5, 6, 7 and 8.

The course consists entirely of lectures, experimental and descriptive. The various theories and the methods of investigation are fully considered.

17. ADVANCED PHYSICAL MEASUREMENTS — MR. JOHN ZELENY
Three credits (six hours per week) — Second semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.

The course is the experimental study of some physical phenomena, the nature or laws of which are not yet understood.

18. ADVANCED PHYSICAL MEASUREMENTS — MR. JOHN ZELENY
Six credits (twelve hours per week) — Second semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is five dollars.

The same as course 17, except that twice as much time is devoted to the subject

19. THE KINETIC THEORY OF GASES — MR. ERIKSON
Three credits (three hours per week) — Second semester

Open to graduate students who have completed courses 5 and 6, and mathematics 9 and 10 (calculus).

This course is a study of Meyer's *Kinetic Theory of Gases*.

20. DISCHARGE OF ELECTRICITY THROUGH GASES — MR. JOHN ZELENY
Three credits (three hours per week) — First semester

Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).

The course consists of lectures, with experimental illustrations, on the conduction of electricity through gases. A study is made of the conductivity imparted to gases by the action of X rays, ultra-violet light, radio-active substances, and glowing metals; of the discharge of electricity from points and in vacuum tubes; and of the spark and arc discharges. The methods of measuring the velocity of the ions and the charges carried by them are studied in detail.

21. THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM — MR. JOHN ZELENY

Three credits (three hours per week) — Second semester

Open to graduate students who have completed courses 6 and 7, and mathematics 9 and 10 (calculus).

This course consists in the study of J. J. Thomson's *Elements of the Mathematical Theory of Electricty and Magnetism.*

POLITICAL SCIENCE

FOR UNDERGRADUATES AND GRADUATES

2. COMPARATIVE GOVERNMENT — MR. ALLIN

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A description and analysis of the government as the agent of the state; a comparative study of the organization and working of the governments of the great European powers of today, especially of France, Germany, Great Britain and Italy. Text, with lectures and assigned readings.

3. THE ELEMENTS OF JURISPRUDENCE — MR. SCHAPER

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

A study of those human relations requiring legal regulation considered from the American point of view; the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is intended for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.

7. MUNICIPAL ADMINISTRATION — MR. SCHAPER

Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

A comparative study in modern city charters and methods of administration, the relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of municipal corruption and merits of proposed reforms. A text, lectures, and special topics.

8. THEORY OF THE STATE — MR. SCHAPER

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 and 2.

A study of the theory of the state, its origin, nature, purpose and justification, the elements of population and territory. Important theories, like the divine, contract, modern socialistic, individualistic, and social welfare, are considered; also the question of state interference and state management of industries. This course includes a study of classification of law, governments, and states. A text-book, with lectures and topical readings.

9. POLITICAL PARTIES — MR. SCHAPER

Two credits (two hours per week) — First semester

Open to those who have completed course 1.

An advanced course in political parties, their origin, development, and function Such topics as methods of making nominations, securing minority representation, the recall, the initiative and referendum are taken up. Text, lectures, and special topics.

10. DIPLOMACY — MR. ALLIN

Two credits (two hours per week) — Second semester

Open to those who have completed course 1.

The object of this course is to outline the growth of the international relations, the mode of conducting foreign affairs, the relation of the treaty-making power to legislation, the duties and immunities of diplomats, the consular service, the framing, interpretation, and termination of treaties and compacts, and the character and procedure of courts of arbitration. A survey will be made of the history of American diplomacy and of contemporary international politics. Text, lectures, and supplementary reading.

12. COLONIAL ADMINISTRATION — MR. ALLIN

Three credits (three hours per week) — Second semester

Open to those who have completed courses 1 and 2.

This course embraces a discussion of the principal classes of colonies, the causes of colonization, the social, economic, and political tendencies of colonial development, imperial relations, preferential trade, and independence. A study is made of the political systems of modern colonial governments, of the organization and administration of the Spanish, English, French, Dutch, German, and American colonies. Lectures, assigned reading, and special topics.

15. STATE AND LOCAL ADMINISTRATION — MR. SCHAPER

Two credits (two hours per week) — Second semester

Open to those who have completed course 1.

A special course in the problems of our state and local governments; a comparative study of new experiments in legislation and administration, the workings of our courts, the jury system, and the new state police. Lectures, cases, and special topics.

FOR GRADUATES

4. AMERICAN CONSTITUTIONAL LAW — MR. SCHAPER

Four credits (two hours per week) — Both semesters

Open to those who have completed courses 1, 2, and 8; both semesters must be completed before credit is given for the first semester; given in alternate years; not offered in 1908-9.

This is an advanced course in the study of the principles of our constitutional law based on important Supreme Court decisions and standard works.

5. INTERNATIONAL LAW — MR. ALLIN

Six credits (three hours per week) — Both semesters

Open to those who have completed courses 1 and 2.

This course treats of the nature, sources, and sanction of international law; of the general principles as developed by positive agreement, common usage, and udicial decisions, in particular of the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. Text, lectures, and supplementary reading.

11. SEMINAR IN POLITICAL SCIENCE — MESSRS. SCHAPER AND ALLIN

Six credits (three hours per week) — Both semesters

Open to graduate students and seniors of suitable preparation.

A seminar for research in the field of political science. A feature of the seminar is the discussion of current problems in politics and administration.

14. ADMINISTRATIVE LAW — MR. SCHAPER

Two credits (two hours per week) — Second semester

Open to those who have completed courses 1, 2, and 8, and to graduates.

A course dealing with administration as a science, its origin and development, the law of officers under the national government, the merit system, and the growth of special administrative tribunals. Text, lectures, and cases.

ROMANCE LANGUAGES

FOR UNDERGRADUATES AND GRADUATES

5. THE CLASSICAL PERIOD OF FRENCH LITERATURE MR. BENTON

Six credits (three hours per week) Both semesters

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

The reading of works and selections produced during the classical period of French literature and conversations in French concerning the same. The works of Corneille, Racine, Moliere, La Fontaine, etc. Compositions.

6. ADVANCED FRENCH CONVERSATION MR. BENTON

Four credits (two hours per week) Both semesters

Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.

Conversations on French history, literature, the drama, etc.

7. FRENCH LITERATURE OF THE NINETEENTH CENTURY MR. BENTON

Six credits (three hours per week) Both semesters

Open to those who have completed course 2 or course 3 and course 5; both semesters must be completed before credit is given for the first semester.

Lectures in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.

8. TEACHER'S COURSE IN FRENCH MR. BENTON

Two credits (one hour per week) Both semesters

Open to those who have completed course five; both semesters must be completed before credit is given for the first semester.

Special practice in pronunciation. Discussion in French of the methods of teaching the French language and literature.

9. ROMANCE PHILOLOGY MR. BENTON

Two credits (one hour per week) Both semesters

Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

Lectures on the phonetical development of the French and other Romance languages from popular Latin. Reading of old French texts.

10. ITALIAN LITERATURE MR. BENTON

Two credits (one hour per week) Both semesters

Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

Edgren's *Italian Grammar*, Dante's *Divine Comedy*.

13. ADVANCED SPANISH MR. MELOM

Six credits (three hours per week) Both semesters

Open to those who have completed course 11 and 12; both semesters must be completed before credit is given for the first semester.

F. Solderilla, *Compendio de la Literatura Espanola;* Alarcon's *El Sombrero de Tres Picos*. Lectures and collateral readings of representative Spanish authors.

14. ROMANCE LANGUAGES: OLD FRENCH MR. BENTON

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Comparative phonetics and grammar of French and other romance languages. Some of the oldest monuments of the French language are studied.

15. HISTORY OF FRENCH LITERATURE MR. BENTON

Two credits (one hour per week) Both semesters

Open to graduate students; both semesters must be completed before credit is given for the first semester.

A discussion of the evolution of the various schools and doctrines in French literature.

16. ITALIAN LITERATURE — MR. BENTON
Two credits (one hour per week) — Both semesters

Open only to graduate students who have completed course 5; both semesters must be completed before credit is given for the first semester.

History of Italian Literature, special: *The Divine Comedy*.

SCANDINAVIAN

FOR UNDERGRADUATES AND GRADUATES

5. OLD NORSE (Icelandic) — MR. BOTHNE
Four credits (two hours per week) — Both semesters

Open to those who have completed courses 1 and 2, or 3 and 4, and to other qualified students with the approval of the department.

Grammar and reading. *Gunnlaugs Saga Ormstungu.*

6. MODERN NORWEGIAN LITERATURE — MR. BOTHNE
Six credits (three hours per wek) — Both semesters

Open to those who have compeeted courses 1 and 2; both semesters must be completed before credit is given forl the first semester.

History of Norwegian literature from 1814 to the present day. Special attention paid to Bjornson and Ibsen.

7. SWEDISH LITERATURE — MR. STOMBERG
Six credits (three hours per week) — Both semesters

Open to qualified students upon the approval of the department; both semesters must be completed before credit is given for the first semester.

History of the literature and study of modern authors, including Selma Lagerlof, Geijerstam, Strindberg.

8. IBSEN — MR. BOTHNE
Two credits (two hours per week) — First semester

Open to qualified students upon the approval of the department. Lectures and readings.

9. HISTORY OF NORTHERN EUROPE — MR. STOMBERG
Six credits (three hours per week) — Both semesters

Open to juniors and seniors; no knowledge of the Scandinavian languages is required.

The course includes the history of the Scandinavian countries from the earliest period to recent times.

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE

13. HISTORY OF THE SCANDINAVIAN LANGUAGES

For courses in Scandinavian philology, see the statement of the department of comparative philology.

SEMITIC LANGUAGES

FOR UNDERGRADUATES AND GRADUATES

1. ELEMENTARY HEBREW — MR. DEINARD
Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors; both semesters must be completed before credit is given for the first semester.

First semester, Harper's *Elements of Hebrew* and reading of easy prose passages from the Old Testament; second semester, critical reading of some book of the Old Testament and a review of Hebrew grammar.

2. ELEMENTARY ARABIC — MR. DEINARD

Six credits (three hours per week) — Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

First semester, Socin's *Arabic Grammar* and the reading of the prose sections contained in it; second semester, selected suras from the Koran and a review of Arabic grammar.

3. ELEMENTARY ARAMAIC OR SYRIAC — MR. DEINARD

Three credits (three hours per week) — Second semester

Open to those who have completed course 1.

The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockelman's *Syrische Grammatik*.

4. HISTORY OF THE HEBREWS TO THE CLOSE OF THE PERSIAN PERIOD — MR. DEINARD

Six credits (three hours per week) — Both semesters

Open to sophomores, juniors, and seniors; no knowledge of any Semitic language is required.

A survey of the political, social, and religious life of the Hebrews. The English Bible will be used as a text-book, a careful study of the Palestinian, Egyptian, and Assyro-Babylonian inscriptions will be made and the works of some modern writers on Hebrew history will be consulted.

FOR GRADUATES

1. CRITICAL STUDY OF ONE OF THE FOLLOWING OLD TESTAMENT BOOKS — MR. DEINARD

Isaiah, The Minor Prophets, The Psalms, or Job.

2. EARLY ARABIC POETRY — MR. DEINARD

And the relation of the Arabic, grammatically considered, to the Hebrew.

3. READING OF THE ARAMAIC PORTIONS OF THE OLD TESTAMENT — MR. DEINARD

And a review of Aramaic grammar.

4. HISTORY, PROPHECY AND THE MONUMENTS — MR. DEINARD

Studies in the early history of the Semites.

SOCIOLOGY AND ANTHROPOLOGY

FOR UNDERGRADUATES AND GRADUATES

5. SOCIAL GROUPS — MR. SMITH

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. THE STUDY OF INSTITUTIONS — MR. SMITH

Three credits (three hours per week) — First semester

Open to those who have completed course 1.

The genesis of custom and the beginnings of law with the geographical and race influence in the growth of states will be studied as well as the various forms of the family and their relation to forms of civilization.

7. ANTHROPOLOGY — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors and seniors.

This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It also investigates the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text books, lectures, assigned readings, and thesis.

8. ETHNOLOGY — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed courses 1, 2, or 7, and to graduate students.

This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of the several races and subraces are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Textbooks, lectures, assigned readings, and thesis.

9. THE PHILIPPINE PEOPLE — MR. JENKS
Three credits (three hours per week) — Second semester
Open to junors, seniors, and graduate students.

This coursel presents the geography, natural resources, and ethnology of the Philippine Islands. A careful comparative study of the four large ethnic and culture groups of people is made; tropical influences are noted; the present policy of the Insular Civil Government is outlined,so far as it tends to modify the natural characteristics and modern culture of the inhabitants, and to affect American home interests in the orient. This course aims to present a practical model for the investigator of human culture, and to introduce students to oriental race problems; it will also better fit students for government business or missionary service in the orient. Lectures, illustrated lectures, assigned readings, and thesis.

10. PHYSICAL ANTHROPOLOGY — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors and seniors who have completed course 7 or 8, and to graduate students.

This course studies the physical variations in the human body. It pays special attention to those variations which distinguish one race or group of men from another; and it seeks the cause and significance of such variations. It also attempts to trace the physical evolution of the human body and to forecast its future, studying both its development and decline. Six lectures on the development and anatomy of the human brain are given by Dr. Charles A. Erdmann of the medical faculty. This course is of prime importance to advanced students preparing for the medical course. Lectures, laboratory work, assigned readings, and thesis.

11. THE AMERICAN NEGRO RACE — MR. JENKS
Three credits (three hours per week) — Second semester
Open to juniors, seniors, and graduate students; not given in 1908-9.

This course begins with a study of the negro's African tribal kinsmen and traces the rise and development of the American negro race from the birth of American slavery. The present characteristics, traits, and conditions of the negro are especially considered. The developing tendencies of the negro are studied for the purpose of considering the probable future of the American negro race. Lectures, assigned readings, and thesis.

12. THE AMERICAN PEOPLE — MR. JENKS
Three credits (three hours per week) — First semester
Open to juniors, seniors, and graduate students.

This course presents the distribution in the United States of the different peoples of the world found here. It seeks the natural genius of the peculiar home development of these peoples, and notes the modifications of this development in America, thus portraying the ethnic contribution of each to American civilization. It aims to discover the dominant physical, mental, and moral characteristics of each people, and attempts to determine the relative ethnic and culture importance of each to the nation.

13. BIBLICAL SOCIOLOGY — MR. SMITH
Three credits (three hours per week) — First semester
Open to juniors, seniors, and graduate students.
Lectures, and the Old Testament as a text book.

14. MODERN SOCIAL INSTITUTIONS — MR. REEP
Three credits (three hours per week) — First semester
Open to those who have completed course 7.

The fundamental social institution, the family, will be studied, as also the development of modern industrial, political, educational, and ecclesiastical institutions in their relation to human progress.

15. SOCIAL PSYCHOLOGY — MR. REEP
Three credits (three hours per week) — First semester
Open to juniors, seniors and graduate students.

This is a study of the social mind, public opinion, implusive and rational social action, fashion, convention and custom, the mob and the crowd. It is also an examination of the theories of Giddings, Tarde, Baldwin, Ross, Brinton and others.

STRUCTURAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

14. STRUCTURAL DESIGN — MR. CONSTANT
Five credits (ten hours per week) — First semester
Post senior. Open to students who have completed courses 12 and 13.

Theory and design of steel structure, including mill buildings, railway and highway bridges standpipes and towers and other problems of structural interest. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part III, Standard Specifications.

15. STRUCTURAL DESIGN — MR. CONSTANT
Five credits (ten hours per week) — Second semester
Post senior, continuation of course 14, C. E.

With special reference to the design of a steel railway bridge and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.

17. MASONRY CONSTRUCTION — MR. CONSTANT
Four credits — First semester
Post senior, preparation required course 12, C. E.

Foundations, design and use of cribs, cofferdams and pneumatic caissons, pressure of earth, design of retaining walls, piers, abutments, dams and chimneys. Properties of stones, bricks, cement and concrete. Recitations and lectures, three hours per week; drawing room work, four hours per week. Fowler's Deep Foundations; Taylor and Thompson's Concrete and Reinforced Concrete; Howe's Retaining Walls for Earth, and current periodical engineering literature.

18. REINFORCED CONCRETE — MR. CONSTANT
Three credits (six hours per week) — Second semester
Post senior. Preparation course 17, C. E., optional.

Theory and design of reinforced concrete beams, slabs and columns, application of reinforced concrete to buildings, dams, retaining walls and arches. Lectures, problems and design. Turneaure and Maurer's Principles of Reinforced Concrete.

FOR GRADUATES

16. **SWING BRIDGES** MR. CONSTANT

Four credits (eight hours per week) Second semester

Post senior, C. E. course.

Theory and design of swing and bascule bridges, with special attention to the design of the operating machinery. Moving structures. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part IV. Reference works on machine design. Students intending to take this course are advised to elect machine design, 13 M. E., first semester, senior year.

19. **HIGHER STRUCTURES** MR. CONSTANT

Theory and design of cantilever, suspension and arch bridges. Analysis of indeterminate structures and complex portal bracing. General theory of flexure and application to special problems.

IX

DEGREES GRANTED IN 1908

Degrees Granted in 1908

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

FOR THE DEGREE OF BACHELOR OF ARTS 214

Aneta Agnes Anderson, Maple Hill, Iowa.
Francis F. Anderson, St. Paul.
Theodora Henrietta Anderson, Montevideo
Tryphena Rebecca Anderson, Montevideo.
Mary E. Armstrong, Minneapolis.
Franz A. Aust, Minneapolis.
Edwin Aygarn, Choice.
Albert Leroy Aylmer, Baltimore, Md.
Marion Louise Barber, Minneapolis.
Emma Beckman, Minneapolis.
Laura Hall Benz, St. Paul.
Vera Doris Billings, St. Paul.
Naneen Mary Blanchard, St. Paul.
Guy Coe Bland, Anoka.
Nina Mae Blossom, Algona, Iowa.
Rena Claire Brainerd, Blooming Prairie.
Elizabeth Marie Breen, St. Paul.
Emma Lillian Brock, Minneapolis.
Mildred Brown, Minneapolis.
Ellen M. Bruce, St. Paul.
Catherine Casey, St. Paul.
Elizabeth Clapp Bruchholz, Minneapolis.
Margaret McD. Buchanan, Minneapolis.
Raymond Cassius Cannon, Watertown, S. D.
Lee Clough, Minneapolis.
Vivian G. Colgrove, Minneapolis.
Lillian Edith Colter, St. Paul.
Ruth Marion Colter, St. Paul.
Jennie G. Craven, Faribault.
William Howard Crawford, Hampton, Ia.
Helen Sherwood Cummings, St. Paul.
Fay Cuzner, Minneapolis.
Juanita H. Day, St. Paul.
Florence D. Deal, Truman.
Harold C. Deering, Minneapolis.
Robert Lane Deering, Minneapolis.
Margarethe Denfeld, Duluth.
Kathryn Dougherty, Mankato.
Anastasia Doyle, St. Paul.
Lloyd L. Duxbury, Caledonia.
Carl T. Ebeltoft, Lake Park.
Marjorie Edwards, Minneapolis.
Edwin G. Eklund, Moorhead.
Janet Grace Elliott, Minneapolis.
Elmer W. Elmquist, St. Paul.
Margaret Allen Elwell, Minneapolis.
Cecile Leffingwell Enegren, Minneapolis.
Albert Grant Evans, Duluth.
Minnie Faegre, Flandreau, S. D.
Edith L. Farwell, Zumbrota.
Agnes Esperance Feeny, St. Paul.
Murlen Fellows, Minneapolis.
Alice Maude Finch, Clinton Falls.
Kate Maud Firmin, Minneapolis.
Lou Burrows Fleming, St. Paul.
Marguerite Beryl Fleming, St. Paul.
Ruby Hope Fletcher, Minneapolis.
Victor Wilbert Fletcher, Farmington.
Leah A. Fligelman, Minneapolis.
Grace L. Gaghagen, Minneapolis.
Walter Judson Gessell, Hanley Sask, Can.
Albert Nicolay Gilbertson, Willmar.
Bertha Louise Gippe, Watson.
Caroline Joanna Gleason, Minneapolis.
Jessie Celestine Goddard, Minneapolis.
Florence Helen Godley, Minneapolis.
Fannie Elizabeth Gordinier, St. Paul.
Kate Greeley, Stillwater.
Alice Evangeline Green, Minneapolis.
Florence Lavinia Grime, Minneapolis.
Ella Josephine Halvorson, Dawson.
Jack Ellis Haynes, St. Paul.
Julie Hille, Fergus Falls.
Emma Mae Hillesheim, Sleepy Eye.
Vinnie Hitchings, Sutherland, Iowa.
Minnie C. Hoffman, St. Paul.
Julia Amanda Holen, Minneapolis.
Lorena Hopkins, Chinook, Mont.
Inez Ianthe Hovey, Minneapolis.

Ida Elizabeth Howe, Racine, Wis.
Lura Claire Hutchinson, Minneapolis.
Rewey Belle Inglis, Minneapolis.
Florence Kimball Jenks, Seattle, Wash.
Anna Josephine Johnson, Minneapolis.
Anna Maria Johnson, Crookston.
Edward Whittemore, Johnson, Rockford.
Ruth Revere Johnson, Minneapolis.
Thekla Eugenia Johnson, Lake City.
Florence Jones, Gaylord.
William Moore Jones, Yanceyville, N. C.
Monica C. Keating, St. Paul.
Margaret M. E. Kelly, St. Paul.
Anne Kennedy, St. Paul.
Grace Marian Kingsley, Minneapolis.
Ralph Thomas Knight, Minneapolis.
Rudolf F. Koessler, Heron Lake.
Mabel LaDue, Minneapolis.
John D. Lange, St. Paul.
F. Hortense Laybourn, Minneapolis.
Mary Louise Leavenworth, Minneapolis.
Bertha Leck, Owatonna.
Harriet Edithe Levin, Aurora.
Margolee Lewis, St. Paul.
Arnold Johnson Lien, Delavan.
Ingebrigt L. Lillehei, Luverne.
Margaret Eleanore Linnan, St. Paul.
Jessie F. Lockman, Minneapolis.
Clara Louise Lougee, Minneapolis.
Mary Amanda Lucas, Minneapolis.
Stella M. Lumley, Minneapolis.
Joseph E. Lunn, Carlton.
Mabel Esther Lyon, Hastings.
Maud Hester Lyon, Hastings.
Margaret E. McFetridge, St. Paul.
George Albert McGarvey, Minneapolis.
Charles Dana McGrew, Howard Lake.
Dora McGuigan, Minneapolis.
Harriett M. MacKenzie, Minneapolis.
Mabel Amelia Mansfield, Minneapolis.
Jessie May Marsh, Claremont.
Sara Thompson Marshall, Minneapolis.
Josephine Agnes Martens, Minneapolis.
Robert Lyon Meech, Minneapolis.
Alice Fowle Melony, Minneapolis.
James Stephen Mikesh, Spillville, Iowa.
Hilda Amelia Miller, St. Paul.
Mabel F. Millie, Minneapolis.
Harriet Dunbar Moore, St. Paul.
Arthur Alfred Morse, Minneapolis.
Frank Wilbur Mottley, Red Wing.
Elmina Nesta, Minneapolis.
Mary Margaret Newton, St. Paul.
Marion Nordbergh, Minneapolis.
Elsa Regina Nordin, St. Paul.
Inez J. F. Norlander, St. Paul.
Emma Flora O'Brien, St. Paul.
Didrick John Olson, Belview.
Hildegard L. E. Ott, Minneapolis.
Matthias Norberg Olson, Belview.
Catherine E. Osia, Humboldt, Iowa.
Orlando E. A. Overn, Albert Lea.
Andrew H. Palmer, Minneapolis.
James W. Papez, Hector.
Florence Eula Paul, Minneapolis.
Albert Sanford Peterson, Wheaton.
Paul Willis Peterson, Minneapolis.
Bernard Pettersen, St. Paul.
Aura I. Phelps, Minneapolis.
Alfred Ault Pickler, Minneapolis.
Lillian Rosabelle Plummer, Minneapolis
Alice Greenleaf Pope, Minneapolis.
Alice Elizabeth Putnam, Minneapolis.
John Henry Ray, Jr., Minneapolis.
Horace Garner Reed, Chicago.
Charles F. Remer, Minneapolis.
Walter Clarence Robb, Minneapolis.
Signe Aurora Rosdahl, Wheaton.
Claude Willard Rossman, Minneapolis.
Honore Veronica Rouse, Minneapolis.
Herbert C. Rowberg, Hanley Falls.
Olive Madge Runey, Minneapolis.
Maurice E. Salisbury, Minneapolis.
LeRoy Woodworth Sanford, Minneapolis
Alma Pearle Sawyer, Minneapolis.
Mina L. Schaetzel, Minneapolis.
Pauline G. Schmidt, Minneapolis.
Albert Gregory Schneiderhan, Jordan.
Emily Schons, St. Paul.
Susie S. Schow, Minneapolis.
Florence Catherine Schroeder, Perham.
John Robert Schuknecht, Minneapolis.
Fay N. Seaton, Jewell City, Kan.
Ella Sevatson, Minneapolis.
Elsie Anna Shadewald, Minneapolis.
Wilber Duane Shaw, Minneapolis.
Mary Eleanor Shiely, St. Paul.
Helen Mary Simerman, St. Paul.
Florence Alberta Sly, Minneapolis.
Anna Margaret Smith, Minneapolis.
Harriet L. Smith, Minneapolis.
Irma Potter Smith, Minneapolis.
James Russel Smith, Minneapolis.
Winifred R. Smith, Duluth.
Rudolph T. Solensten, Minneapolis.
Alma L. Stake, Anoka.
Georgina Sterling, Red Wing.
Dorothea Stewart, Minneapolis.

Edna Stewart, Minneapolis.
Thomas Otto Streissguth, Arlington.
P. A. Sveeggen, Minneapolis.
Henry Swanstrom, Lake Park.
Abigail D. Switzer, Minneapolis.
Delia Frances Thompson, Minneapolis.
Gertrude May Thompson, Minneapolis.
Ella Bertha Thorson, Winthrop.
Margaret H. Trimble, Minneapolis.
Mamie E. Waddell, St. Louis Park.
Margaret Ellen Walker, Williston, N. D.
Mary Genevieve Walston, Minneapolis.
Ruby Wasser, Minneapolis.
Alice Aurelia Watson, St. Paul.
Freda Weinstein, Helena, Mont.
Helen Whitney, Minneapolis.
Anna Whittle, Minneapolis.
Sadye Whittle, Minneapolis.
Charlotte Amelia Wiggen, Red Wing.
Susan Zenobia Wilder, Minneapolis.
Beatrice Isabelle Williams, Minneapolis.
Mary Louise Williams, St. Louis Park.
Chester Sawyer Wilson, Stillwater.
Elizabeth Columbus Wolfe, Minneapolis.
Luella M. Woodke, LeMars, Iowa.
Elizabeth Yerxa, Minneapolis.
Augusta Ziegler, Minneapolis.

FOR BACHELOR OF SCIENCE 9

Leon A. Barney, Minneapolis.
Henry Bryan Dorr, Asbury Park, N. J.
Alf Hoff, St. Paul.
Carl Lyle Hobson, Hampton, Ia.
Angell S. Holland, Benson.
Charles G. Nordin, St. Paul.
Manford O. Oppegaard, Madison.
Jalmar H. Simons, Waseca.
Frederick Joseph Souba, Hopkins.

THE COLLEGE OF EDUCATION

FOR BACHELOR OF ARTS—In Education 11

Carrie Bush, Minneapolis.
Ethel Bush, Minneapolis.
Maude Gertrude Bush, Minneapolis.
Louise Kathleen Catur.
Nellie Margaret Dunivon, St. Paul.
Lucy Inez Hutchinson, Minneapolis.
V. Russell Manning, Minneapolis.
Willis Twiford Newton, Minneapolis.
Reuben W. Oakes, Worthington.
Gustavius M. Sachs, New Prague.
Alice Winter, Minneapolis.

THE GRADUATE SCHOOL

FOR MASTER OF ARTS 21

Donald C. Babcock, Grand Forks, N. D.,
B. A. '07, Minnesota.
Major, Sciology and Anthropology; Minors, Philosophy, Psychology.
Thesis, Origin and Development of Religious Experience.

John M. Brendal, Glenwood.
B. A. '06, Luther College, Iowa.
Major, English; Minors, Comparative Philology, Scandinavian.
Thesis, Scandinavian Influence upon English.

Ernest J. Colberg, St. Peter.
B. A. '06, Gustavus Adolphus.
Major, English; Minors, Scandinavian, Latin.
Thesis, The Dramas of August Strindberg; Some Aspects of Their Ideas and Their Technic.

George Rupert Eichholzer, Owatonna.
B. A. '07, Minnesota.
Major, Political Science.
Minors, History, Economics.
Thesis, The Merit System as Applicable to the Various Administrative Departments of Minnesota.

Lucius Arnold Frye, St. Paul.
B. A. '07, Minnesota.
Major, Political Science; Minors, Economics, Sociology.
Thesis, A Suggested Method of Controlling the Public Service Corporations of Minnesota.

Grace Mitchell Groat, Minneapolis.
B. L. '99, Minnesota.
Major, English; Minors, French, Philology.
Thesis, The Psychology of English Rhythms.

Howard H. Hare, Minneapolis.
B. A. '07, Minnesota.
Major, History; Minors, Philosophy, Greek.
Thesis, The Transition from a Provincial to a State Government in New Hampshire.

Martin Hegland, St. Anthony Park.
B. A. '04, St. Olaf.
Major, English Philology; Minors, Education, Philosophy.
Thesis, An Historical and Semasiological Study of Some Synonyms, Nouns, Verbs, and Adjectives Denoting Pleasure.

Minnie Louise Hills, St. Paul.
B. A. '07, Minnesota.
Major, English; Minors, Education, Sociology.
Thesis, A Comparison of Milton and Shakespeare as Thinkers and Writers.

Albert Eddy Julien, Braham.
B. A. '03, Hamline.
Major, Neurology; Minors, Physiology, Pathology and Bacteriology.
Thesis, The Intrinsic and Efferent Fibers of the Cerebellum.

Homer B. Latimer, Minneapolis.
B. A. '07, Minnesota.
Major, Animal Biology; Minors, Animal Biology, Botany.
Thesis, The Lateral Line of Polydon Spathula.

Edward M. Lehnerts, Minneapolis.
B. S. '02, Pennsylvania.
Major, Education; Minors, Botany, Geology.
Thesis, The Teaching of Geography.

Migio Miyazaki, Tokio.
B. A. '02, Waseda University, Japan.
Major, Philosophy; Minors, Sociology, Education.
Thesis, Japanese Morality, a Criticism.

Alice M. Misz, St. Paul.
B. A. '07, Minnesota.
Major, Botany; Minors, Animal Biology, Geology.
Thesis, A Revision of the North American Species of Vaccinium.

Sedona Fesenbeck Nelson, Minneapolis.
B. A. '04, Michigan.
Major, English; Minors, German, Philosophy.
Thesis, Shakespere in German Literature.

Leonard H. Pryor, Fairmont.
B. A. '02, Minnesota.
Major, Education; Minor, Psychology.
Thesis, A Practical Teaching of Secondary Mathematics.

Rasmus S. Saby, Radcliffe, Iowa.
B. A. '07, Minnesota.
Major, Political Science; Minors, Philosophy, Psychology.
Thesis, Early Railroad Legislation in Minnesota.

Conrad G. Selvig, Rushford.
B. A. '07, Minnesota.
Major, Education; Minors, Psychology, Sociology.
Thesis, Federal Aid to Schools.

Emma White Shellenberger, St. Anthony Park.
Ph. B. '00, Iowa.
Major, English; Minors, French, German.
Thesis, Usage and History of English Idiom.

Theodore T. Stenberg, Ormsby.
B. A. '06, Minnesota.
Major, English; Minors, Psychology, Education.
Thesis, The Function and Value of the Stage.

Mary C. Van Wert, Minneapolis.
B. A. '05, Minnesota.
Major, Animal Biology; Minors, Botany, Geology.
Thesis, A Contribution to the History of Entomology in the United States.

FOR MASTER OF SCIENCE 2

Frank F. Grout, Minnesota.
B. S. '04, Minnesota.
Major, Geology; Minors, Chemistry, Physics.
Thesis, The Granites and Associated Quartz Basalts of Stearns Co., Minn.

John Wilson, Minneapolis.
B. S. '03, Wisconsin.

Major, Sanitary Engineering; Minors, Bacteriology, Reinforced Concrete.
Thesis, Sewage System and Disposal Plant at the State Agricultural School and Experiment Station.

FOR DOCTOR OE PHILOSOPHY 3

Henry Anton Erikson, Minneapolis.
B. E. E. '96, Minnesota.
Major, Physics.
Minors, Physics, Mathematics.
Thesis, The Ionization of Gases at High Pressures. .

Frederick C. Miller, St. Paul.
B. A. '03, M. A. '07, Minnesota.
Major, Political Science; Minors, History, Geology.
Thesis, History and Organization of the Police.

Olaf M. Norlie, Atwater.
B. A. '98, St. Olaf, M. A. '01, Wisconsin.
Major, English; Minors, Education, Scandinavian.
Thesis, The Principles of Expressive Reading, a Study of the Human Voice

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

FOR CIVIL ENGINEER 29

J. Wesley Ash, Grand Forks, N. D.
Oscar J. Bergoust, Tacoma, Wash.
LeRoy F. Borrowman, Stillwater.
Harry E. Brenchley, Minneapolis.
John Walter Comstock, Minneapolis.
Arthur Norman Dallimore, St. Paul.
William Fred Doeltz, Jr., Minneapolis.
Henry Knox Dougan, Minneaoplis.
Douglas R. Fleming, St. Paul.
Pierce Powers Furber, Minneapolis.
Hugh Newton Gage, Winona.
Andrew P. Hustad, Granite Falls.
Herbert Hamilton Knowlton, Minneapolis.
William Louis Krauch, St. Paul.
Fred E. Lang, Austin.
Dwight Webster Longfellow, Minneapolis.
Harry John McCall, Minneapolis.
Andrew J. McCree, St. Paul.
Clarence Ward Mowery, Northfield.
Lewis Magnus Norelius, Luverne.
Day Ira Okes, Minneapolis.
Melvin Samuel Olsen, Spring Valley.
John Quinn, Minneapolis.
Charles N. Robertson, Sleepy Eye.
Edward C. Schlattman, Alberta.
George William Walker, Minneapolis.
Gustaf Frederick Widell, Mankato.
Roy Willis, St. Paul.
Oscar Frederick Wodrich, Dubuque, Ia.

FOR MECHANICAL ENGINEER 16

Ole Andreas Anderson, Hawley.
Stanley Eugene Bingham, New Ulm.
Halstad Powell Councilman, Minneapolis.
Richard Ferguson Cox, Graceville.
Harvey Cole Estep, Minneapolis.
Frank R. Fleming, St. Paul.
Hobart Dickinson Frary, Minneapolis.
Stanley Gordon Harwood, Minneapolis.
Percival Hetherton, Minneapolis.
Thomas C. Morris, Minneapolis.
Emil Francis Norelius, Luverne.
Clyde Wood Norton, Lisbon, N. D.
George T. Peterson, New Ulm.
George Walter Priedeman, St. Paul.
James Walsh, Northfield.
Erwin L. F. Weber, Helena, Mont.

FOR ELECTRICAL ENGINEER 25

Frank Arthur Anderson, Wells.
Alfred Bachrach, Faribault.
George J. Brown, Minneapolis.
Robert J. S. Carter, Austin.
James William Casberg, Minneapolis.
Neil Currie, Jr., Minneapolis.
Alfred Richard Frahm, Rochester.
Glenn H. Hoppin, Minneapolis.
Henry Hovelson, Minneapolis.
Roy Kauffman, Minneapolis.
Alfred Benjamin King, Clark, S. D.
Allan Lindsay McAfee, St. Paul.

Frank Joseph Pancratz, Perham.
Clarence Alfred Peterson, Blooming Prairie.
Robert Shaffer Prentice, Minneapolis.
Wm. F. H. Schildt, Hastings.
Alfred Walter Schoepf, Appleton.
Francis George Scobie, Duluth.
Leonard B. Sperry, Wasioja.
Percy Granville Sturtevant, Detroit.
George Peter Svendsen, Minneapolis.
Frank Swanstrom, Lake Park.
Oliver Sweningsen, Austin.
William Mathias Weibeler, Belle Plaine.
Louis Peter Zimmerman, Waseca.

FOR BACHELOR OF SCIENCE—In Engineering 6

Charles P. Clarke, Elysian.
Arthur Bernard Fruen, Minneapolis.
Robert N. King, Minneapolis.
Louis Williams McKeehan, Minneapolis.
Harry B. Roe, St. Paul, Minn.
Robert John Schmid, Rochester.

THE SCHOOL OF MINES

FOR ENGINEER OF MINES 15

Patrick James Boyle, Indianapolis, Ind.
James Alexander Cullyford, Duluth.
Christen Frederick Dahl, St. Hilaire.
William Albert Deichen, St. Paul.
Frank Raymond Edwards, Minneapolis.
William Robert Goodwin, Minneapolis.
John Alden Grimes, Minneapolis.
Ole G. Hoaas, Fertile.
John Joseph Kennedy, St. Paul.
Arthur Knickerbocker, Staples.
Alfred Monroe Locke, Minneapolis.
John Stanley Olmstead, Brownsville, Texas
Andrew Peterson, Red Wing.
Joseph S. Peterson, Minneota.
John Lawrence Strong, St. Paul.

THE SCHOOL OF CHEMISTRY

FOR BACHELOR OF SCIENCE—In Chemistry 7

Edward X. Anderson, Minneapolis.
Walter Lucius Badger, Minneapolis.
Charles Royal Cressy, Minneapolis.
John M. Lowe, Minneapolis.
Russell S. McBride, Minneapolis.
Allen Harold Porter, Minneapolis.
Oric Ogilvie Whited, Jr., Minneapolis.

THE COLLEGE OF AGRICULTURE

FOR BACHELOR OF SCIENCE—In Agriculture 4

George Gooding Ainslie, Rochester.
Thomas Poe Cooper, Minneapolis.
Hall B. White, Winnebago.
William White, Camden, N. J.

FOR BACHELOR OF SCIENCE—In Home Economics 2

May Erwin, St. Paul.
Inez Martha Hobart, Minneapolis.

FOR BACHELOR OF SCIENCE—In Forestry 1

Georges de S. Canavarro, Honolulu, Hawaii

THE COLLEGE OF LAW

FOR MASTER OF LAWS 6

Herman Mathew Feroe, LL. B, Minneapolis.
Elias Johnson Lien, LL.B., St. Paul.
Albert W. Mueller, LL.B., New Ulm.
Anthony J. Praxel, LL.B., Minneapolis.
Josephine Schain, LL. B., Minneapolis.
Wadsworth A. Williams LL. B., Minneapolis.

FOR BACHELOR OF LAWS 86

Lawrence Russell Allison, Minneapolis.
James Bradford Baker, Brownton.
Reinhold K. Batzer, Royalton.
Herman J. Bott, Minneapolis.
Marcus Edward Brown, St. Paul.
Edward Timothy Burk, Valley City, N. D.
Harvey B. Burk, Minneapolis.
Edward Phillip Cady, Pipestone.
Roy English Campbell, Minneapolis.
Harry Summers Carson, Minneapolis.
Clifford C. Champine, Minneapolis.
Algernon O. Colburn, Minneapolis.
Henry J. Coleman, Minneapolis.
Lester William Crawhall, Minneapolis.
Walter Francis Dacey, Minneapolis.
Murray T. Davenport, Minneapolis.
William Henry Dempsey, Minneapolis.
Francis Marion Dolan, St. Paul.
William John Donohue, Minneapolis.
David Wilfred Doyle, Great Falls, Mont.
Reuben E. Edquist, Minneapolis.
Abelius Eenkema, Clara City.
Eliza P. Evans, Minneapolis.
Frank Taggart Everhard, Minneapolis.
Andrew Fawcett, Minneapolis.
Milton Phillip Firestone, St. Paul.
Willie Kerr Foster, Renville.
David Langdon Fulton, Minneapolis.
Leroy A. Gage, Minneapolis.
Cassius E. Gates, Minneapolis.
Harry Gavere, Minneapolis.
Hammond Bey Greene, Sheldon, N. D.
Charles William Greening, Grand Meadow.
Benjamin Feland Groat, Minneapolis.
William Harold Gurnee, Minneapolis.
William Hanson Haas, St. Paul.
Alfred Ulysses Hamrum, Franklin.
George Norman Henderson, Red Wing.
Harry Getchell Higgins, Minneapolis.
Virgil Goodman Hinshaw, Minneapolis.
Stanley B. Houck, Summit, S. D.
Joseph A. Hosp, Hopkins.
Henry N. Jenson, Detroit.
Franz O. G. Jevne, Meridian, Wis.
Robert E. Johnson, Minneapolis.
Wilbur Birch Joyce, Minneapolis.
Laurel L. Kells, Sauk Centre.
Helon Edwin Leach, Spring Valley.
Charles Emory Lockerby, Mapleton.
Lewis Kent Lohn, Fosston.
Mark M. McLaughlin, Minneapolis.
Raymond A. McOuat, St. Paul.
Karl Adolph Machetanz, St. Paul.
Charles E. W. Maloy, St. Cloud.
Edward K. Massee, Minneapolis.
Francis A. Molyneaux, Jr., Winnebago.
Russell L. Moore, St. Paul.
Frank Leonard Morse, Minneapolis.
James Henry Mulally, Danvers, Mass.
Olin Cornell Myron, Vermillion, S. D.
Jared Augustus Perkins Neal, Minneapolis.
Severt Ambrose Nelson, Minneapolis.
Edward Herbert Nicholas, Minneapolis.
Frank E. Norton, Minneapolis.
Joseph A. S. O'Gordon, Minneapolis.
Brynjolf Oyen, Watson.
Edward S. Pattison, Durand, Wis.
Samuel James Radcliffe, Larimore, N. D.
Horace Wills Roberts, Minneapolis.
Clarence H. Running, Ada.
John C. Russell, Fairfax.
Garfield H. Rustad, Moorhead.
John Saari, Sparta.
Louis Benjamin Schwartz, St. Paul.
Spencer Judd Searls, Faribault.
Henry B. Senn, Kasson.
Edward Sigerfoos, Minneapolis.
Lloyd Edward Sigmond, Zumbrota.
William Reed Simmons, Minneapolis.
Henry LeFevre Smiley, St. Paul.
William C. Smiley, St. Paul.
Niles Madison Sorenson, Hayfield.
Paul D. Stratton, Granite Falls.
George Francis Sullivan, Shakopee.
Ingman Swinland, Halstad.
Derwood Washington, Glendive, Mont.

THE DEPARTMENT OF MEDICINE

FOR DOCTOR OF MEDICINE 35

THE COLLEGE OF MEDICINE AND SURGERY 32

Ida Mary F. Alexander, B. A. Carver.
Roy Newbery Andrews, Mankato.
Charles Joseph Bloom, Whitehall, Mich.
Rolland A. Bock, Pharm. C., St. Paul.
August Edward Bostrom, B. S., Minneapolis.
Leon Morelle Boyd, Alexandria.
John C. Brown, Minneapolis.
Herbert Arthur Burns, Hutchinson.
Henry E. Dahleen, Granite Falls.
Frederick Alonzo Engstrom, Cannon Falls.
John Esser, Austin.
George Bysshe Eusterman, Lewiston.
Edward Louis Fortier, Little Falls.
Henry Oswald Grangaard, Kindred, N. D.
Ernest Eugene Hemingway Minneapolis.
Charles Norton Hensel, S., Paul.
William Sidney Hitchings, Jr., Minneapolis.
Edward James Johnston, St. Cloud.
Edward John Lawrence, Marshall.
Arvid C. Lindberg, Harris.
William Francis Maertz, New Prague.
Gustav Alfred Magnusson, Harris.
James Rollin Manley, Duluth.
Melvin Sylvanius Nelson, B. S., Dawson
Carl M. Roan, Minneapolis.
Dennis E. Ryan, Shakopee.
Clarke Sherwood Smith, Bozeman, Mont.
Eugene Benson Stebbins, Minneapolis.
Arthur Clarence Strachauer, Minneapolis.
George Hamilton Walker, Pawnee City, Nebr.
John Franklin Walker, St. Paul.
Tolbert Watson, Cashel, N. D.

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY 3

Arthur Duncan Sinclair, Minneapolis.
Justin Thomas Smallwood, Worthington.
K. Ward Wilder, Minneapolis.

THE COLLEGE OF DENTISTRY

FOR DOCTOR OF DENTAL SURGERY 43

William J. Bandelin, Arlington.
Charles John Bergh, St. Paul.
Clarence C. Broderson, Fountain City, Wis.
Elmer W. Bunce, Primghar, Iowa.
Lauren M. Coleman, Ellendale, N. D.
Jesse Francis Conway, Lake City.
Stephen V. Conway, Minneapolis.
Ralph W. Countryman, Minneapolis.
Valentine Adolph Frants, Montgomery.
C. Edwin Grafsland, Lake Park.
Gustave Adolph Hagberg, Minneapolis.
Harry Weston Harmon, Faribault.
Francis Randall Harrison St. Cloud.
Clifford C. Higgins, Sidney, Ohio.
Isaac Stephenson Hull, St. Paul.
Meredith Jay James, Lake Crystal.
William Henry James, Lake Crystal.
Joseph Johnson, Minneapolis.
Joseph Almon Kjelland, Rushford.
Karl G. Knoche, St. Paul.
Harry Comegys Lawton, St. Paul.
Daniel James Leary, Portage, Wis.
Edorf Menton Lier, Ashby.
Frederick M. Madden, Watertown.
Peter James Miesen, St. Peter.
Thomas J. Moore, Chatfield.
Herbert A. Munns, Minneapolis.
Charles John Olson, Hastings.
Harley Adolph Radermacher, Barron, Wis.
Frederick Louverne Rayman, Austin.
Herman C. Remele, Minneapolis.
Carl L. Sandstrom, Cloquet.
John Earl Schapler, Pipestone.
Leroy Christian Schmitz, Jamestown, N.D.
Edwin James Simon, St. Paul.
Lynn R. Snyder, Lake City.
Lee Erwin Spurbeck, Two Harbors.
William Paul Tanner, Cannon Falls.
William M. Trench, Dennison.
Arthur A. Van Dyke, St. Paul.
Abram P. Whitson, Packwaukee, Wis.
Melvin Bruce Will, Mapleton.
Louis Bernard Williams, Ashland, Wis.

THE COLLEGE OF PHARMACY

FOR BACHELOR OF PHARMACY 18

Dolph Church Alcott, Lakefield.
Fred Monroe Bowman, Browns Valley.
John Younglove Breckenridge, Jr., Pine City.
Frank A. DeWitz, Rochester.
Arthur W. Eckstein, New Ulm.
Earl S. Erckenbrack, Parkers Prairie.
Alvin LeRoy Dretchko, Winthrop.
Bernt Olaf Gronvold, Kenyon.
Alf J. Gundersen, Pelican Rapids.
George A. Holmgren, Breckenridge.
Edward Perry Jones, Blue Earth.
Asa Frederick Kurth, Hendricks.
Roy R. Lambert, Royalton.
Arthur E. Lovdahl, Park Rapids.
Ingvald S. Pladson, Minneapolis.
Richard H. Puhl, Menomonie, Wis.
Ernest Albert Stoppel, Rochester.
George Claude Weber, Rochester.

Honors and Prizes

DEGREES WITH DISTINCTION 13

IN ECONOMICS

William H. Crawford.
Harold C. Deering.
Arthur A. Morse
Fay N. Seaton.

IN ENGLISH

Mary Alice Winter.

IN GEOLOGY

Andrew H. Palmer.
Edward W. Johnson.

IN HISTORY

Alice G. Pope.

IN LATIN

Willis T. Newton.
Della F. Thompson.

IN PHILOSOPHY

Elmer Elmquist.
Ingebrigt Lillehei.

IN SOCIOLOGY AND ANTHROPOLOGY

Albert N. Gilbertson.

DEGREE CUM LAUDE 1

IN LAW

Derwood Washington.

CERTIFICATE OF PROFICIENCY IN MUSIC

Awarded to Gertrude R. Hull.

THE '89 MEMORIAL PRIZE IN HISTORY

Awarded to Arnold J. Lien.

THE ALUMNI WEEKLY GOLD MEDAL

Awarded to Stanley B. Houck.

THE ALBERT HOWARD SCHOLARSHIP

Awarded to Matthias N. Olson.

X

STUDENTS

Students

The College of Science, Literature, and the Arts

SENIORS—197

Acomb, Marie R., Minneapolis.
Adams, C. Roy, Austin.
Altenburg, Carl L., Wells.
Anderson, Carl A., Hutchinson.
Anderson, Herbert I., Goodhue.
Babcock, Fager M., Minneapolis.
Baillif, Matilda, Osakis.
Bardsley, Myrtle, Duluth.
Beals, James B., Minneapolis.
Beardsley, Edythe, Hibbing.
Beck, Clara L., St. Paul.
Bell, Grace, St. Paul.
Bennett, Lillian, Madison.
Berger, Nanda M., St. Paul.
Bickford, E. Albi., Battle Lake.
Blakey, Roy, Minneapolis.
Blanchett, Frederic J., Elk River.
Bolcom, Winfred G., Chatfield.
Bredvold, Louis, Belview.
Briggs, Florence M., St. Paul.
Brink, Irma, Minneapolis.
Brown, Mayme E., Granite Falls.
Bruhn, Louise H., Minneapolis.
Burgan, Myrle E., Minneapolis.
Burnett, Ralph, Cummings, N. D.
Cant, Harold G., Duluth.
Carlson, Charles E., Albert Lea.
Carpenter, Lucy, Helena, Mont.
Cassidy, Anna C., Eyota.
Chapman, Esther, Minneapolis.
Chase, Marjorie C., Minneapolis.
Child, Emily, Minneapolis.
Churchill, Alta P., Minneapolis.
Clark, Miriam S., Minneapolis.
Connelly, John, Savage.
Conway, Ethelyn, Detroit.
Cosgrove, Ethel C., State Fair Grounds.
Crosby, Walter, Willmar.
Dahleen, Harry W., Maynard.
Danielson, Jessie L., Litchfield.
Davidson, Hazel B., Minneapolis.
Davis, Alfred, Minneapolis.
Dellinger, Virginia E., St. Paul.
Diamond, Lewis S., Mankato.
Dickerson, Helen, Minneapolis.
Dunning, Frances D., Minneapolis.
Engstrom, Lillian F., Minneapolis.
Erickson, Jennie S., Anoka.
Ewy, Edwin W., Butterfield.
Finkle, Lillian S., Minneapolis.
Ford, Gertrude, St. Paul.
Foulke, Robert W., St. Paul.
Fraiken, Wanda, Minneapolis.
Francis, Helen E., St. Paul.
Franklin, Laura G., Blue Earth.
Frenzel, Rose M., St. Paul.
Fulkerson, Jay E., Zumbrota.
Gardner, Alice, Minneapolis.
Gausemel, Arthur N., Kenyon.
Gilpin, John, Minneapolis.
Gould, Marian R., Minneapolis.
Graves, Arthur R., Minneapolis.
Grimes, Gordon, Minneapolis.
Hale, Beatrice E., Spring Valley.
Hallock, Mary J., Duluth.
Hanaford, A. Ruth, Minneapolis.
Hanratty, Catherine, Graceville.
Hanson, Bertha Mary C., Minneapolis.
Harding, Fred A., Minneapolis.
Harms, Samuel F., Norwood.
Harrison, Ruth Minneapolis.
Hart, Una M., Anoka.
Heinsius, Cecil M., Minneapolis.
Hellickson, Blanche, Mabel.
Herum, Helen Minneapolis.
Hill, Clarence E., Minneapolis.
Hixon, Agnes, Minneapolis.
Holcomb, Dora M., Warren.
Holm, Eva C., Stillwater.
Holt, Blanche M., Minneapolis.
Hoovel, Violet S., Minneapolis.
Hovey, Albert P., Minneapolis.

Hoyum, Anna Nelson, Minneapolis.
Hubbard, Katherine D., Mankato.
Hudson, Neva B., Minneapolis.
Hull, Harold J., Wahpeton, N. D.
Hull, Mabel B., Litchfield.
Hull, William M., Minneapolis.
Hunt, Thomas F., Le Sueur Centre.
Jenness, Maurice V., Willmar.
Jensen, Louise, Minneapolis.
Johnson, Esther C., Minneapolis.
Kelley, Frances R., Minneapolis.
Kessel, Martha C., Cresco, Ia.
Klimenhagen, Olive, St. Paul.
Kline, Gertrude, Minneapolis.
Knutson, Dagny, St. Cloud.
Kreis, Cora, Monticello.
Krueger, Richard G., Bellingham.
Kuethe, Emma S., Preston.
Lambert, Percy, Sauk Centre.
Lanterman, Evert, Mandan, N. D.
Lawton, George T., Minneapolis.
Leach, Grace, Spring Valley.
Leland, Rosamond, Minneapolis.
Leonard, Elva L., Minneapolis.
Leslie, Ruth, Minneapolis.
Leuthold, Walter M., Minneapolis.
Leveroos, Ethel, Minneapolis.
Lewis, E. Genevieve, Minneapolis.
Lovick, Paul J., Minneapolis.
Lowenthal, Max, Minneapolis
Lycan, Donna M., Bemidji.
McCune, Robert H., Benson.
McIvor, Helen L., St. Paul
McOuat, Frances M., Minneapolis.
Maland, Joseph O., Elmore.
Manderfeld, Cornelia B., Minneapolis.
Mason, Adelaide, Alexandria.
Matson, Charlotte, Minneapolis.
Matchan, Roy W., Zumbrota.
Maul, Earl O., Minneapolis.
Mecklenburg, George, Cedar.
Melin, E. Luther, Minneapolis.
Mooney, Florence H., Duluth.
Moore, Edna, St. Paul.
Morgan, Edith, St. Cloud.
Mouser, Carl B., Minneapolis.
Mousley, Josephine, Litchfield.
Nelson, Harriet, Minneapolis.
Nelson, Robert, Minneapolis.
Newell, Agnes F., Minneapolis.
Nicholson, Pearle Camp, Minneapolis.
Nielsen, Marie B., St. Paul.
Norelius Wm. A., Luverne.
Nystrom, Hilda, Minneapolis.
Overpeck, Nell, St. Paul.
Palmer, Alice H., Minneapolis.
Palms, Edith, Minneapolis.
Paula, Sister, Duluth.
Pennington, Hazel, St. Paul.
Pitblado, Annie, Minneapolis.
Potter, Zenas L., Minneapolis.
Putnam, Gladys, Minneapolis.
Quigley, Alice R., Bird Island.
Reely, Stella Anne, Minneapolis.
Rehnke, Edgar B., Minneapolis.
Reid, Harry C., Sleepy Eye.
Rice, Mary G., Minneapolis.
Riheldaffer, Helen, Minneapolis.
Ringsred, Ruth E., Duluth.
Robinson, Fred H., Scobey, Mont.
Rockwood, Edith, Minneapolis.
Roverud, Nora, Caledonia.
Rowe, Elfie, Minneapolis.
St. Amour, Ruby C., Minneapolis.
Salisbury, Eva, Minneapolis.
Saterlie, Julia K., Montevideo.
Schriber, Alice E., St. Paul.
Schroeder, Anna T., Perham.
Shanley, Helen, St. Paul.
Shonts, Mary O., Fergus Falls.
Simmons, Juliet, Hunter, N. D.
Simpson, Jessie, Minneapolis.
Sinclair, Catherine, Fairmont.
Sleeper, Raymond A., Sheldon, Ia.
Smiley, William Yale, Minneapolis.
Smith, Audrey N., Minneapolis.
Smith, Marjorie, Minneapolis.
Solon, Lorraine, Minneapolis.
Spear, Florence, Minneapolis.
Spink, Helen E., White Bear.
Stegner, Hope A., St. Paul.
*Strate, Clara, Moorhead.
Stromgren, Lucia, Center City.
Sturtevant, Abby, Minneapolis.
Svensrud, Ida, Minneapolis.
Tallant, Ruth L., Minneapolis.
Tanikawa, Yoshio, Tsu Ise, Japan.
Thomson, H. Sears, Minneapolis.
Toomey, Mary, St. Paul.
Trask, Bertha M., Herman.
Turnbull, Lloyd W., Minneapolis.
Ueland, Elsa, Minneapolis.
Uzzell, Thomas H., Morgan Park, Chicago Ill.
Van Rhee, George, Milaca.
Van Slyke, Lois C., Minneapolis.
Von Scholten, Toska M., Minneapolis.
Waite, Camelia, Minneapolis.
Ware, Jennie, St. Paul.
Wedge, Vera E., Zumbrota.

Weese, Asa O., Hutchinson.
Welch, Louise, St. Paul.
Wigforss, Nanna, Red Wing.
Woolsey, Leona, Minneapolis.
Yates, Fanny A., St. Paul.
Yeaton, Walter J., Minneapolis.

* Died 1908.

JUNIORS—264

Aichele, Johanna, St. Paul.
Anderberg, Irene A., Sisseton, S. D.
Anderson, Clara S., Milan.
Anderson, Roscoe B., Minneapolis.
Anderson, Walter E., Stillwater.
Bamber, Carlotta, Rochester.
Barclay, Luvia, Minneapolis.
Barke, Arthur R., Fergus Falls.
Barlow, Frank, Kasson.
Barnard, Paul J., Minneapolis.
Berchem, Pauline, St. Paul.
Berrisford, Mercedes, St. Paul.
Bethke, William, Franklin.
Bibb, Frank, Minneapolis.
Birkenhauer, Mary, Minneapolis.
Bowen, Mercy H., St. Paul.
Bowyer, Helen, Murillo, Ont.
Boyson, Maybelle, Minneapolis.
Brigham, Helen, Minneapolis.
Brinsmaid, Martha M., Minneapolis.
Brohaugh, George, Shelley
Brown, Edna M., Minneapolis.
Brown, Thirza ,Minneapolis.
Bruce, Edna A., Minneapolis.
Buck, Florence, Minneapolis.
Burns, Margaret, Graceville.
Burton, Lois L., Alden.
Caldwell, Josephine, St. Paul.
Cammack, William R., St. Paul.
Campbell, Stella, Tracy.
Carlson, C. Arthur, Minneapolis.
Carlson, Esther E., Minneapolis.
Carlson, Ethyl Belle, Minneapolis.
Celestine, Sister, Duluth.
Chance, Harold K., Minneapolis
Chenery, Isabella, Jamestown, N. D.
Chesnut, Edward T., Minneapolis.
Clapp, Ella, St. Paul.
Clark, Harriet O., Minneapolis.
Clendening, Gladys, Minneapolis.
Coleman, Myrtle, Minnetonka Beach.
Collier, Frances L., Minneapolis.
Collins, Lucile, Minneapolis.
Collins, Thos. J., Minneapolis.
Comstock, Belle May, St. Paul.
Confer, Marie, Kansas City, Mo.
Coon, Chauncey C., Minneapolis.
Cosgrove, Edward B., St. Paul.
Cowling, Helen, Ely.
Crawford, Ruth, Minneapolis.
Critchett, Francis E., New Ulm.
Crittenden, Ethel, Minneapolis.
Crocker, Katherine, Minneapolis.
Crogan, Mattie, Minneapolis.
Currie, Helen H., Minneapolis.
Cutler, Mary E., Minneapolis.
Dahl, Olga, Minneapolis.
Deming, Portia, Minneapolis.
Dinsmoor, Viola, Austin.
Dix, Gertrude Ethel, Minneapolis.
Donaghue, Belle, Minneapolis.
Dorsey, Cora, Minneapolis.
Dorsey, James E., Minneapolis.
Downey, Vina K., Minneapolis.
Dunlap, Alta, Mandan, N. D.
Duvigneaud, Jeanette A., Minneapolis.
Duxbury, Leland S., Caledonia.
Eckholdt, Laura B., Minneapolis.
Edgar, Hazel C., St. Paul.
Eenkema, Katherine, Clara City.
Elke, Estella L., Chaska.
Elmquist, Marie, St. Paul.
Engle, Margaret, Minneapolis.
Erdall, Agnes R., Minneapolis.
Evans, Nevada S., Minneapolis.
Fagundus, Ruth, Minneapolis.
Ferguson, Clare, Minneapolis.
Fernald, Robert N., St. Paul.
Fiske, Cyrus H., St. Paul.
Fitzsimmons, Mary A., St. Paul.
Foley, Mabel M., Minneapolis.
Freeman, Howard H., Washburn Park.
Gardner, Edwin L., Minneapolis.
Gaylord, Robert M., Minneapolis.
Gibbs, Velzora A., Waterville.
Gilbert, Grace, St. Paul.
Gilger, Bessie, Minneapolis.
Giltinan, Eleanor, Minneapolis.
Gould, Anna M., Glencoe.
Grapes, Iva, Adrian.
Green, Ethelinda B., Stillwater.
Gullickson, Glenn, Minneapolis.
Gundersen, Margaret E., Minneapolis.
Gurley, George P., Minneapolis.
Haines, Helen B., Minneapolis.
Hamilton, William J., Minneapolis.

Hammond, Eva G., Minneapolis.
Hankey, Clara Minneapolis.
Hanson, Minnie O., Morris.
Haupt, Mary C., St. Paul.
Hayes, Mary C., Minneapolis.
Headley, D. Grant, Two Harbors.
Heritage, Mary Hill, Hudson, Wis.
Herring, Hazle S., Riceville, Ia.
Hill, Robert A., Minneapolis.
Hobbs, Marabeth, Minneapolis.
Hodgson, Marie, Minneapolis.
Hoffmann, Pauline, St. Paul.
Holmen, Helen, Kenyon.
Holt, Mabel, Minneapolis.
Hudson, Dorothy, Minneapolis.
Hudson, Mabelle, Minneapolis.
Hutchinson, Enid M., Minneapolis.
Jewett, Helen E., Fergus Falls.
Johnson, Fred. R., New Richland.
Johnson, Freda D., St. Paul.
Johnson, Henry G., Minneapolis.
Johnson, Marie, Minneapolis
Johnson, Millie E., Minneapolis.
Kellogg, Ada B., St. Paul.
Kemp, Etheleen, Minneapolis.
Kitaji, Sentaro, Singu, Japan.
Knewbuhl, Emily, Minneapolis.
Koerner, Illa, St. Paul.
Lampert, Edna, Minneapolis.
Lane, Anna M., St. Paul.
Laughlin, Vera M., Eau Claire, Wis.
Lawrence, Marion, Minneapolis.
Lenart, Elta, Minneapolis.
Leonard, F. Perry, Minneapolis.
Lia, Alma, Hancock.
Lloyd, Frances H., St. Paul.
Loomis, Ruth Robbins, Robbinsdale.
Loomis, Veda, Minneapolis.
Losse, Hyme, Minneapolis.
Lucker, Edith M., Minneapolis.
Lundeen, Marie, Minneapolis.
Lydon, Helen, Minneapolis.
Lyford, Stella E., St. Paul.
Mabie, Harriet, Minneapolis.
Machen, Jane, Savanna, Ill.
Mallory, Walter, St. Paul.
Maloy, Agnes C., St. Cloud.
Marden, Irene, Barnesville.
Mathes, Florence, St. Paul.
McCullough, Clara M., Buffalo.
McDermott, Joseph C., Clontarf.
McDowell, Effie, Hutchinson.
McFetridge, Auverne, St. Paul.
McGovern, Almira, Hammond, Wis.
McKennan, Pearl, Minneapolis.
McKenzie, John, Jr., Lake Benton.
Miller, Arleigh R., Minneapolis.
Montgomery, John, Minneapolis.
Munck, Harold, Owatonna.
Murseth, M. Lillian, Minneapolis.
Naeve, Edith A., Minneapolis.
Nelson, Edna C., Red Wing.
Nelson, Herbert, Minneapolis.
Nelson, O. Norman, St. Paul.
Nesse, James N., Mabel.
Newhall, Richard A., Minneapolis.
Newton, Caroline, Minneapolis.
Nichols, Marjorie P., Pipestone.
Nickell, Marion, Minneapolis.
Nixon, Hugh H., Wells.
Norris, Sadie, Minneapolis.
Nutter, Hannah, Minneapolis.
Ober, Mary L., Duluth.
O'Leary, Abigail, Wabasha.
Olsen, Phoebe M., Minneapolis.
Olsgard, Eugene, Minneapolis.
Olson, Mary D., Lake Park.
Olston, Herbert L., Minneapolis.
Ostby, Gena, Minneapolis.
Ovestrud, Edmund, Spring Grove.
Paddock, Laura, Minneapolis.
Painter, Helen D., Minneapolis.
Parkell, Irene M., Minneapolis.
Parker, Alonzo E., North Branch, Ia.
Petersen, Ernest A., Albert Lea.
Peterson, Sigurd, Minneota.
Phelan, Mary, Graceville.
Pidgeon, Vernon, Minneapolis.
Pinkus, Olga, St. Paul.
Pitts, Eva L., Alton, Ia.
Pomeroy, Eunice, Minneapolis.
Putnam, Leslie R., Minneapolis.
Quigley, Catherine, Bird Island.
Race, Adah M., Minneapolis.
Ramsey, Grace, Minneapolis.
Ramsland, Rudolph J., Sacred Heart.
Rankin, Edward P., Jamestown, N. D.
Reed, Ethel E., Minneapolis.
Renning, Clara, Kasson.
Reque, Anna D., Decorah, Ia.
Ries, Joseph A., Fairfax.
Robbins, Esther M., Robbinsdale.
Robinson, Sarah, Minneapolis.
Rogers, Caroline E., Minneapolis.
Rossi, Julia, Mantorville.
Rothrick, H. B., Minneapolis.
Rowe, Ina, Minneapolis.
Rowley, Edith K., Minneapolis.
Sackett, Ina P., Minneapolis.
Salzer, Helen C., Minneapolis.

Scharf, Arthur, Lake City.
Schmidt, Matilda, Minneapolis.
Schulte, Henry, Plato.
Schwartz, Katherine, Omaha, Neb.
Seabury, Paul R., St. Paul.
Seaman, Susie, Minneapolis.
Sedgwick, Fred G., Minneapolis.
Sefton, Adel, St. Paul.
Simmons, Marjorie M., Hunter, N. D.
Simms, Marjorie, Minneapolis.
Sinclair, Myra Jean, Minneapolis.
Sinderson, Grace, Minneapolis.
Skoglund, Alma G., North St. Paul.
Sly, Gertrude B., Minneapolis.
Smith, A. Blanche, Rochester.
Smith, Corinne, St. Paul.
Smith, Eunice H., Minneapolis.
Smith, Maud M., Miles City, Mont.
Snell, Charles F., Detroit.
Snere, Irma L., Minneapolis.
Souba, Lucie, Hopkins.
Spring, Arthur D., Minneapolis.
Stearns, Gertrude C., Hutchinson.
Stoft, Esther, Minneapolis.
Stork, Allen, Harmony.
Storr, Hazel, St. Paul.
Stratton, Ethel, Minneapolis.
Strong, Louise A., Minneapolis.
Sutton, Pearl G., Stillwater.
Swanson, Gertrude M., St. Paul.
Swedberg, Luella C., Luverne.
Swinburne, Gertrude, Minneapolis.
Tate, Elizabeth, Faribault.
Tebbets, Marion, Minneapolis.
Terriore, Margery, Minneapolis.
Thomson, Theodore W., Minneapolis.
Thorsen, Elizabeth, Minneapolis.
Thuet, Julia, Minneapolis.
Tillotson, Alice, Minneapolis.
Tisdale, Mary Vaill, Slayton.
Tornstrom, Mary, Stillwater.
Turner, Winifred E., Minneapolis.
Turnquist, Florence, Minneapolis.
Utendorfer, George W., Gaylord.
Vance, Erskine W., Crookston.
Vidal, James H., Minneapolis.
Warren, Jessie A., Minneapolis.
Wash, Allan J., Minneapolis.
Webster, Jennie, Minneapolis.
Wessberg, May, Fergus Falls.
White, Lucy J., Luverne.
Williams, George E., Minneapolis.
Williams, Howard, Minneapolis.
Winterer, Florence, Valley City, N. D.
Winterquist, Albert L., Little Falls.
Witchie, Hazel M., Minneapolis.
Wretling, Hilma E., Alexandria.

SOPHOMORES—308

Ainsworth, Caroline, Minneapolis.
Aldrich, Robt. G., Osakis.
Allen, Arthur E., Minneapolis.
Allen, Edgar M., Minneapolis.
Allen, William L., Minneapolis.
Amy, Helen L., Minneapolis.
Anderson, Alice E., Minneapolis.
Anderson, Henrietta, Clarkfield.
Anderson, Hilda A., St. Paul.
Anderson, Joseph Elmer, Amboy.
Anderson, Marie L., Minneapolis.
Andrews, Dalton, St. Paul.
Applebee, Ruby M., Anoka.
Arnold, Benjamin E., Brainerd.
Ayers, Grace F., Minneapolis.
Babcock, Lana, Minneapolis.
Bailey, Herbert, Jackson.
Baillie, James G., Virginia.
Beddall, Claude R , Ellsworth, Wis.
Beeman, Elna, Minneapolis.
Billau, Helen, St. Paul.
Blake, Frances E., St. Paul.
Bobb, Bessie E., Minneapolis.
Bonniwell, Donna, Minneapolis.
Borden, Ethel, Minneapolis.
Borst, R. Warner, Minneapolis.
Bowman, Clementine, Howard Lake.
Boyd, Susan E., Minneapolis.
Braden, Elizabeth, Minneapolis
Brande, G. Herbert, Minneapolis.
Branham, Alice, Minneapolis.
Breen, Genevieve R., Minneapolis.
Brooks, Ida, Mansfield, S. D.
Brown, Arthur V., Alexandria.
Brown, Doris L., Minneapolis.
Browne, Marie, Minneapolis.
Bruchholz, Henry V. A., Minneapolis.
Bruder, Victor W., Minneapolis.
Bryant, Stewart, St. Paul.
Buckley, Irene H., Minneapolis.
Burgett, Georgia L., Faribault.
Burkhard, Arthur O., Preston.
Burns, Bessie, Graceville.
Buswell, Calvin, Minneapolis.
Byrnes, Lyle, Minneapolis.
Cabot, Verne S., Hector.

Campbell, Lowell M., Minneapolis.
Carey, Elizabeth, Minneapolis.
Carman, Paul L., Minneapolis.
Casey, Elizabeth, St. Paul.
Casey, Joseph T., Franklin.
Casey, Nellie, St. Paul.
Chilson, Alice, Howard Lake.
Clark, Jennie, St. Paul.
Clark, Margaret B., Minneapolis.
Cliff, F. Neil, Ortonville.
Clifford, C. May, West Concord.
Collins, Elsie M., Crookston.
Corbett, Louise, St. Paul.
Cornies, Albert P., Plato.
Cotnam, Louise, St. Paul.
Cowan, Frances W., Minneapolis.
Cox, F. Hanford, Cloquet.
Currier, Helen L., Minneapolis.
Dane, Harold J., St. Paul.
Davies, Pearl J., Afton.
Davis, Margaret G., Minneapolis.
Day, Levi W., Clinton Falls.
Dayton, Josephine, Minneapolis.
De la Barre, Louise, Minneapolis.
Dickinson, Rhoda, Buffalo.
Didier, Marcelle C., Minneapolis.
Doherty, Vivienne R., Minneapolis.
Donaldson, Zoe, Minneapolis.
Donohue, John N., St. Paul.
Doremus, Fern, Duluth.
Drake, Leah R., Detroit.
Du Toit, Dana W., Minneapolis.
Eder, Walter H., Blue Earth.
Edsall, Mary Louise, Minneapolis.
Ehrl, Eda, Minneapolis.
Eisler, Charles J., Minneapolis.
Elliott, William T., Minneapolis.
Engberg, Edward John, Cambridge.
Erd, Marie, Minneapolis.
Erickson, Beda, Minneapolis.
Erickson, Ruth, Minneapolis.
Ewing, Louise, St. Paul.
Faegre, J. Barthell, Flandreau, S. D.
Fletcher, Margaret N., Mneapolis.
Fligelman, Frieda, Helena, Mont.
Foley, Florence, Stillwater.
Ford, Beth E., Mazeppa.
Foster, Bernice, Duluth.
Foster, Evelyn, Minneapolis.
Foster, Mary, Duluth.
Fuller, Ruth, Minneapolis.
Gage, Pansy M., Minneapolis.
Gee, Marian, Minneapolis.
Gillette, Raymond M., Minneapolis.
Goldsmith, Glenn, Hutchinson.
Goodman, A. Laird, Duluth.
Graff, Fred W., Cooperstown, N. D.
Grand-Maitre, Blanche, Floodwood.
Gronseth, Mabel, Red Wing.
Grutterson, Alvin W., Lake Crystal.
Hanke, Ethel F., Minneapolis.
Hamer, Alta L., Kenyon.
Hansen, Anna M. K., Minneapolis.
Hansen, Pearl C., Duluth.
Harris, Charles L., Minneapolis.
Hart, Verna M., Minneapolis.
Heffner, Bernhardina, Minneapolis.
Henderson, Elizabeth, Minneapolis.
Hensel, Kenneth N., St. Paul.
Hermann, Ruth E., Minneapolis.
Hibbard, Hazel L., Minneapolis.
Hixey, Merle, Minneapolis.
Hillman, Merton S., Minneapolis.
Hitchcock, Blanche S., Minneapolis.
Hitchcock, Helen, Minneapolis.
Hodapp, Aloys P., Eagle Lake.
Hodgson, Drusilla M., Elbow Lake.
Holmer, Adolph F., Virginia.
Holmes, Donald S., Duluth.
Houck, Margaret, Minneapolis.
Houghtaling, Elma, Fairmont.
Hull, Anne, Minneapolis.
Jacobson, Albert, Jewell, Ia.
Jensen, Dora, Minneapolis.
Johnson, Allina, Minneapolis.
Johnson, Irene B., Minneapolis.
Johnston, Lisle A., St. James.
Jones, Elinor, Wabasha.
Joyce, Helen, Minneapolis.
Julien, Margaret, St. Paul.
Kaiser, Walter, Stillwater.
Kelley, Alta, Crystal Bay.
Kells, Lyman, Sauk Center.
Kentner, Mattie G., Dawson.
King, Mary, Ellendale, N. D.
Kingsford, W. G., Mazeppa.
Kirkevold, Hans P., Hendricks.
Klatt, Albert, Waconia.
Klein, Kenneth O., Minneapolis.
Klimenhagen, Ray R., St. Paul.
Klossner, Lulu, Winthrop.
Knappen, Marjorie, Minneapolis
Kramer, Anna, Minneapolis.
Lange, Lorna, St. Paul.
Larsen, Albertine, Halstead.
Lee, Ruth, Stillwater.
Leete, Helen P., Sparta, Wis.
Lenning, A. Viola, Duluth.
Lien, Luella, Granite Falls.
Lilienthal, Charlotte, Minneapolis.

Lindberg, Lillian, Little Falls.
Lindem, Zelma M., Herman.
Lindgren, Agnes A., Minneapolis.
Linton, Hildur T., Minneapolis
Longstaff, R. S., Huron. S. D.
Love, Genevieve, Wayzata.
Lucker, Edith, Minneapolis.
Lutzi, Pearl A., Minneapolis.
Lyle, Marie O., Minneapolis.
McCall. Margaret, Minneapolis.
MacCallum, Marion S., Minneapolis.
McConkey, Clyde J., Brewster.
McConnell, Vera G., Minneapolis.
McCray, Alice R., St. Paul.
McDermott, Helen C., Rhinelander, Wis.
McGregor, Della, St. Paul.
McHugh, Helen, Goodhue.
McKeen, Edwin, Minneapolis.
McKenzie, John Wallace, Groton, S. D.
McMillan, Effe, Luverne.
McNally, William J , Minneapolis.
Magnuson, Ida, Red Wing.
Mark, Mary E., St. Peter.
Martens, Irma, Minneapolis.
Marvin, Mary M., Zumbrota.
Mason, Harold O., Minneapolis.
Mather, Wm. S., Minneapolis.
Matheson, Amer C., St. Hilaire.
Matson, Ethel R., Minneapolis.
Melbourn, Della, Minneapolis.
Menefee, Guy C., Albert Lea.
Merriman, Mildred, Minneapolis.
Mielke, Edwin J., Glencoe.
Miles, Alice M., St. Paul.
Miles, Mary R., Fergus Falls.
Millar, Marguerite I., Minneapolis.
Miller, Eliz. W., Minneapolis.
Minier, Emma, New Richmond, Wis.
Mitchell, Hattie, Minneapolis.
Morin, Alvida J., Aberdeen, S. D.,
Moulton, Nettie, Dawson.
Muir, Helen, St. Paul.
Murayama, Takashi, Tokio, Japan.
Murnane, Winifred, St. Paul.
Neumeier, Karl G., Stillwater.
O'Connor, Irene, Renville.
O'Hare, Edward S., Minneapolis
Olsen, Myrtle F., Minneapolis.
Ostergren, Ralph C., Gladstone.
Overlock, Ellen, Minneapolis.
Palmer, Ben, St. Paul.
Parks, Carl H. Montevideo.
Parsons, B. France, Minneapolis.
Patterson, Helen, Minneapolis.
Payette, Charles T., Minneapolis.
Pearce, Amy E., Hibbing.
Peik, Wesley E., Jordan.
Pershon, Erich, Young America.
Petersen, Laura Muller, Minneapolis.
Peterson, Harry H., St. Paul.
Peterson, Julian M., Bemidji.
Petterson, Gustav S., Battle Lake.
Phelps, Louana, Duluth.
Phillips, Mellie R., Minneapolis.
Pope, Anna E., Minneapolis.
Prest, Helen, St. Paul.
Ramsey, Harold, Minneapolis.
Rankin, Charlotte, Minneapolis.
Rathbun, Russell B., Minneapolis.
Reed, Mary L., Duluth.
Rees, Lester, Minneapolis.
Reese, Frank, Minneapolis.
Rickert, Paul M., Minneapolis.
Rippe, Lorena E., Fairmont.
Roberts, Caroline D., Minneapolis.
Roberts, Edward B., Minneapolis.
Robinson, Grace E., Minneapolis.
Roddis. Louis H., Osakis.
Roenisch, Clinton W., Minneapolis.
Root, Dorothy A., Minneapolis.
Rosenwald, Reuben M., Plato.
Rosing, Marguerite, St. Paul.
Ruble, Edna, Albert Lea.
Rude, Emil, Pelican Rapids.
Russell, Loretta, Minneapolis.
Ryan, Clara. Freeport, Ill.
Sage, Edith, Minneapolis.
Sanborn, Helen A., Minneapolis.
Sawyer, Sara E., Minneapolis.
Saxton, Florence, Minneapolis.
Schabacker, Carrie, Menomonie, Wis.
Schulstad, Einar T., St. Paul.
Schulz, Alma, Brainerd.
Sende, Jonas A., Monticello.
Senescall, Cleve, Ortonville.
Shan on, Bess L., Minneapolis.
Shearer, Hermione, Minneapolis.
Shepardson, Charlotte, Minneapolis.
Shepley, Clara, Minneapolis.
Sherwin, Eva, Monticello.
Sias, De Forrest J., Madison.
Simmons, Frank H., Minneapolis.
Simmons, Ralph A., St. Paul.
Sinclair, Nora F., Fairmont.
Smart, Ruth A., St. Paul.
Smith, Alice L., Minneapolis.
Smith, Arthur P., Minneapolis.
Smith, F. Paul, Groton, S. D.
Smith, Ralph G., Groton, S. D.
Smith, Vera C., Minneapolis.

Snell, Ella M., St. Paul.
Soloway, Sol., Minneapolis.
Springer, George T., Gladstone, Mich.
Stadsvold, Sidney, Austin.
Starrett, Raymond L., Minneapolis.
Steffen, Theodor, New Ulm
Steinmetz, Jennie C., Minneapolis.
Stellwagen, Grace, Minneapolis.
Stevens, Dorothy C., Minneapolis.
Stiles, Glenn S , Minneapolis.
Sturtevant, F. Hardy, Detroit.
Suffel, Wm. Reynolds, Duluth.
Sutton, George E., Prior Lake.
Swain, Lila, Powers.
Swenson, Clarence E., Luverne.
Swenson, Esther L., Minneapolis.
Switzer, Elsie L., Minneapolis.
Thelen, Edward, Stillwater.
Thompson, May A., Los Angeles, Cal.
Totton, Frank M., Minneapolis.
Trautman, Olivia, Minneapolis.
Trevette, Hazel E., Minneapolis.
Tupper, Emily H., Minneapolis.
Tuseth, Amanda, Osseo.
Tydeman, F. E., Montevideo.
Van Vliet, Florence L., Minneapolis.
Viker, Selma H., Halstead.
Ware, Frederick, Minneapolis.
Warren, Louise, Minneapolis.
Waugh, Charlotte, St. Paul.
Weesner, Beulah, Minneapolis.
Wentz, Anna, Red Wing.
Whaley, Clementine R., St. Paul.
Williams, Eliz., Minneapolis.
Withee, Hazel E., St. Paul.
Woolsey, Lillian L., Minneapolis.
Wright, Mary, Minneapolis.
Wyckoff, George S., Worthington.
Wyman, Harold C., Minneapolis.
York, Anne G., Minneapolis.
Young, Blanche M., Minneapolis.

FRESHMEN—422

Abrahamson, Frances B., Houston.
Allen, Harriet, St. Paul.
Allen, Laura F., Minneapolis.
Alley, E. Louise, Minneapolis.
Amber, J. Walter, Fosston.
Ames, Laura, Willmar.
Ames, Luella B., Minneapolis.
Amundsen, M. H., Alexandria.
Anderson, Belle, Mazeppa.
Anderson, Edna, St. Paul.
Anderson, Martha, Audubon.
Anderson, Verna May, Mazeppa.
Babcock, Marjorie, Winnipeg, Man.,
Baillie, Earle C., Minneapolis.
Baker, Virginia, Brownton.
Barnaby, Anne L., Minneapolis.
Barnes, Mildred, Minneapolis.
Barry, Arthur, Minneapolis.
Bates, Wilbur K., Lake City.
Beehler, Irma A, Minneapolis.
Bergh, Maybelle, Spring Grove.
Berglund, J. LeRoy, Cambridge.
Bertram, Edward H., Minneapolis.
Bibb, Eugene, Minneapolis.
Billings, C Lee, St. Paul.
Bingenheimer, Margaret, Mandan, N. D
Bjeldanes, M. Augusta, Madison.
Borst, Homer W., Minneapolis.
Boxell, Adah K., St. Paul.
Brand, Myrtle, Minneapolis.
Brecke, Amanda, Minneapolis.
Brockway, Truma F., Luverne.
Brooks, Robert L., Minneapolis.
Broom Alice G., Minneapolis.
Brossard, Frances, Farmington.
Brown, Caroline, Minneapolis.
Brown, Chester, Buffalo, N. D.
Brown, Vesta, Minneapolis.
Brunelle Henry D., Cloquet.
Bryant, Gordon, St. Paul.
Bryant, John, Minneapolis.
Buckley, Catherine, Farmington.
Burns, Bessie, Graceville.
Burtness, Ruby, Enderlin, N. D.
Bush, Leila M., Dover.
Cahalan, Vera, Miller, S. D.
Caldwell, Louise, St. Paul.
Cammack, Gertrude, St. Paul.
Cant, Kenneth S., Duluth.
Carpenter, Glenn, Minneapolis.
Carr, Edna, St. Paul.
Caster, Elizabeth J., Minneapolis.
Catur, Edith G., St. Paul.
Chamberlain, Victor P., Minneapolis.
Chilton, Freeman E., Howard Lake.
Cirkel, Florence A., Minneapolis.
Clarity, Cecil, Minneapolis.
Clawson, Leonard H., New Castle, Ind.
Claypool, Agnes, Minneapolis.
Clement, Ruth M., Minneapolis.
Clifford, Ralph, Grand Forks, N. D.
Colgrove, Laura M., Minneapolis.

Collier, Ava I., Minneapolis.
Collins, Harry, Minneapolis.
Corbin, Mary R., Elk River.
Cornish, Mary E., Vernon Center.
Cornish, Ruth, Vernon Centre.
Crary, Josephine, Minneapolis.
Crocker, Thomas, Minneapolis.
Curial, Marie T., Anoka.
Current, Edith, New Ulm.
Currie, Paul M., Minneapolis.
Currier, Donna, St. Paul.
Dahl, Borghild, Minneapolis.
Davis, Grace O., Minneapolis.
Day, Frances, Minneapolis.
Dedolph, Louise G., St. Paul.
Dellinger, Margaret, St. Paul.
Dickinson, Dwight, Excelsior.
Doherty, Fayette C., Tracy.
Drake, Edward R., St. Paul.
Drake, Lenore, Minneapolis.
Drake, Zieda J., Minneapolis.
Dressel, Howard C., Le Sueur.
Drew, Cosette, Minneapolis.
Duffy, Lina, Fond du Lac, Wis.
Dunlop, Ednah, Minneapolis.
Dunn, Harold E., Luverne.
Dwyer, Mollie, Minneapolis.
Ebel, Gertrude, Minneapolis.
Eder, Everett E., Blue Earth.
Edgerly, Hattie, Mahnomen.
Egan, John K., St. Paul.
Engle, Eloise, Minneapolis.
Erdall, Arthur C., Minneapolis.
Erickson, Victor L., Stillwater.
Evans, Ida C., Kasson.
Evans, Pearsall W., Minneapolis.
Evers, J. A., Minneapolis.
Everts, Carolyn L., Minneapolis.
Faegre, A. Leonard, Flandreau, S. D.,
Falk, Byron, Otisville.
Feir, Earl E. Christenson, Wood Lake.
Ferguson, Janet, Minneapolis.
Filk, Anna M., Biscay.
Fissell, Walter, Minneapolis.
Fitzsimmons, Helena, St. Paul.
Fleming, Geraldine F., Brainerd.
Fleming, James J., St. Paul.
Fleming, William S., Minneapolis.
Flinn, Irma, Minneapolis.
Forrer, Minnie, Minneapolis.
Francis, Florence M., Minneapolis
Frankoviz, Nan, Fergus Falls.
Freeman, Neda B., Minneapolis.
Freeman, Theodore, Minneapolis.
Furlow, Walter S., Rochester.
Galliven, Nona, St. Paul.
Gamble, George H., Rochester.
Ganley, Frank, Minneapolis.
Ganssle, Grace. Minneapolis.
Ganssle, Waldorf L., Minneapolis.
Gardner, Frances E., Minneapolis.
Gates, Vernon, Rochester.
Gaus, Glendora, Minneapolis.
Giessler, Margaret, Minneapolis.
Gilkey, Harry A., Minneapolis.
Gillam, Stanley S., Windom.
Glynch, Frank, Minneapolis.
Goodwin, G. E., Webster, S. D.
Goold, Raymond H., Minneapolis.
Gould, Della, Glencoe.
Gowan, Claudia, Duluth.
Grant, Florence E., Minneapolis.
Gray, Grace A., St. Paul.
Greenly, Marshall H., Minneapolis.
Greiner, Oscar F., Chaska.
Griffin, Elsie H., Winona.
Grimes, Willard M., Edina.
Groettum, Rosetta, Minneapolis.
Gruman, Beatrice, Minneapolis.
Gude, Therese, Duluth.
Guernsey, Herbert J., Minneapolis.
Guethling, Minnie, Detroit.
Guy, Elnora, Minneapolis.
Hahn, Louis, Minneapolis.
Hall, Gertrude, Minneapolis.
Halstead, Paul B., St. Paul.
Hamilton, Floy K., Minneapolis.
Hanks, Mabelle L., Minneapolis.
Harrison, Helen, Minneapolis.
Hartman, Laura J., Minneapolis.
Harwood, Laura B., Minneapolis.
Hastings, Ellen M., Elk River.
Haugen, Nina S., Pelican Rapids.
Herber, Jessie A., Minneapolis.
Highland, Albert T., Langford, S. D.
Hill, Florence, Minneapolis.
Hillesheim, Gertrude M., Sleepy Eye.
Hilyer, Gale P., Duluth.
Hixon, Charles S., Minneapolis.
Hoag, Helen, Minneapolis.
Hoff, Borghild, Duluth.
Hoff, Ethel C., Minneapolis.
Hoff, Ethel Eunice, Sheldon, N. D.
Holden, Cora B., Minneapolis.
Holmen, Gertrude, Kenyon.
Homan, Audrey J., Minneapolis.
Hooker, Mercy, Chicago, Ill.
Hotchkiss, Robert, Minneapolis.
Hoy, Mary E., St. Paul.
Hughart, Jessie M., Minneapolis.

Hull, Bert J., Wahpeton, N. D.
Hultrans, Hilding, Minneapolis.
Humphrey, Kittie, Minneapolis.
Hurd, Glenn A., St. Paul.
Hutchinson, Emmajean, Faribault.
Hutchinson, Marjorie, Minneapolis.
Ingalls, Katherine, Minneapolis.
Ireland, Max, Dowagiac, Mich.
Jesness, Ingwold, Fosston.
Jesness, Oscar B., Fosston.
Johnson, Ada F., Benson.
Johnson, Carolyn A., St. Paul,
Johnson, Edythe, Cooperstown, N. D.
Johnson, F Roy., Cast'eton, N. D.
Johnson, Per Otto S., Duluth.
Jones, Charles H., Mitchell, S. D.
Jones, Mary W., Minneapolis.
Kanter, Alex. B., Minneapolis.
Keating, Edward, Minneapolis.
Keating, Kathryn, Minneapolis.
Kennedy, Agnes, St. Paul.
Kent, Fay Marie, Minneapolis.
Kesson, Stella R., Byron.
Kiplinger, Carl T., Lena, Ill.
Kjerland, Gratia, Minneapolis.
Kneebone, Rubina, Chisholm.
Koontz, Zora V., Minneapolis.
Kreis, Foster H., Minneapolis.
Labbitt, Ruby, Detroit.
Lagerquist, Helen, Minneapolis.
Lane, Eva E., Minneapolis.
Lane, L. Emmett, Minneapolis.
Lang, Roy, Glenville.
Larson, Alfred, Gary, S. D.
Larson, Amanda E., Minneapolis.
Larson, Elvira C., Minneapolis
Larson, Emanuel E., St. Paul.
Larson, Henry N., Houston.
Larson, Nettie, Minneapolis.
Lemke, Edna Gooch, St. Paul.
Lemon, Kenneth, St. Paul.
Lenz, Henry, Kennan, Wis.
Leonard, Faith, Minneapolis.
Leonard, Gladys, Minneapolis.
Liebenstein, Harry J., Whittemore, Ia.
Littel, Josephine, Minneapolis.
Look, Charles L., Sioux Falls, S. D.
Lovdahl, Mabel, Park Rapids.
Loyhed, Lois D., Faribault.
McAlmon, William, Minneapolis.
McBean, Alan J., Minneapolis.
McCall, Harrison, Minneapolis.
McCanna, Mable, Minneapolis.
McCargar, Fred, Montevideo.
McCawley, Anna K., Stillwater.
McCormick, Elmer, White Bear.
McCulloch, Hazel, Minneapolis.
McDivitt, Florence, Minneapolis.
McElroy, Monica, Minneapolis.
McEwen, Nora, St. Paul.
McGinty, Jenny E., Wayzata.
McGowan, Louise, Janesville, Wis.
MacLean, Edwin L., Minneapolis.
MacLennan, Ada, Grand Rapids.
McMahon, Lynnferd, Fergus Falls.
MacMullan, Rita, Minneapolis.
McNair, H. Harvey, St. Paul.
Macdonald, Alice, St. Paul.
Madden, Alecia V., Minneapolis.
Mageissen, Solveig, Minneapolis.
Major, Laura K., Minneapolis.
Mannheimer, George, St. Paul.
Marks, Edna A., Minneapolis.
Marquis, Antonia E., Minneapolis.
Mason, Dorothea, Minneapolis.
Matteson, Pearl, Minneapolis.
Mattson, Gustav J., Winthrop.
Meili, Irma, St. Paul.
Melin, E. Eleanor, Minneapolis.
Metcalf, F. Elliot, Madison, S. D.
Mettling, Pearle, Montevideo.
Mickelson, John, Cummings.
Miller, Eva S., Long Prairie.
Miller, Guy C., Winnebago.
Miller, Lucile C., Minneapolis.
Moe, Norman, Lake Crystal.
Montgomery, Mary, Greenfield, Ind.
Morton, Claude S., Brickton.
Muckley, Rose, Ottawa.
Muir, Jean I., Winnebago.
Nelligan, Francis E., Monson, Mass.
Nelson, Albert, Minneapolis.
Nelson, Eva T., Afton.
Nelson, Robert M., St. Paul.
Newton, Ethel R., Ortonville.
Nicholson, Arnold R., Minneapolis.
Niles, Harriet, Menomonie, Wis.
Niles, Natalie T., Anoka.
Norman, Ebba, Minneapolis.
Norton, Dorrice, St. Paul.
Norwood, Vivian, Minneapolis.
Ober, Catherine, Minneapolis.
Oberg, Laura, Minneapolis.
O'Brien, Julia, Brainerd.
Odell, Corinne V., Minneapolis.
Ogg, Edna, Orange City, Ia.
Olson, Florence, St. Paul.
Olson, Margretta, Seattle, Wash.
Olston, Arthur J., Minneapolis.
O'Neil, Grace, Minneapolis.

O'Neill, Richard, Graceville.
Overn, Oswald, Albert Lea.
Palmer, Mary J., Minneapolis.
Palmer, Ruth, Mankato.
Palmer, William, Le Roy.
Parker, Frederick L., St. Paul.
Partridge, Jessie, Owatonna.
Passmore, George, Minneapolis.
Paulsen, Walter H., Pipestone.
Payne, Catherine B., Minneapolis.
Payne, D. J., St. Paul.
Pearce, Myrtle, Hibbing.
Pearce, Will R., Minneapolis.
Pellatt, Amy R. A., Minneapolis
Pendergast, Bernice, St. Paul.
Peterson, Harry, St. Paul.
Peterson, Mabel F., Minneapolis.
Peterson, Pearl, Dawson.
Phillips, Charles, Minneapolis.
Phoenix, Maida, St. Paul.
Piemeisel, Robert L., Jordan.
Pierce, Dora, Minneapolis.
Pierce, Grace, Minneapolis.
Pirsch, Joseph H., Caledonia.
Plummer, Winnie, Minneapolis.
Poore, John C., St. Paul.
Prisk, Ethel, Ely.
Puffer, Paul, Minneapolis.
Quinn, Winifred, Minneapolis.
Raine, Nellie I., Minneapolis.
Ramsett, Bertha E., Willmar.
Randall, Laura, St. Paul.
Ransom, Ruth, Minneapolis.
Rasmussen, Peter L., St. Paul.
Rathbun, Bertha, Rochester, N. Y.
Ray, Philip L., Minneapolis.
Reed, Frances, Minneapolis.
Reedall, Allen H., Minneapolis.
Reeves, Jay E., Groton, S. D.
Reum, Virginia S., Minneapolis.
Rice, James J., Minneapolis.
Rice, Kenneth L., Adrian.
Roberts, Clinton R., Lime Springs, Ia.
Robertson, Ethel R., Minneapolis.
Robinson, G. Virginia, Montevideo.
Rogers, Helen, Faribault.
Rorem, Allen T., Minneapolis.
Rosche, Elizabeth M., Stillwater.
Russell, Jean, Minneapolis.
Rypins, Stanley I., St. Paul.
Sands, Grace, Minneapolis.
Schons, Wilhelmina, St. Paul.
Schroeder, Helen, St. Paul.
Schroeder, Mayme, Perham.
Scully, Helen, Stillwater.
Sealander, Elof, Detroit.
Sefton, Beatrice, St. Paul.
Seide, Henry, Milbank, S. D.
Shelley, Marie, Minneapolis.
Shephard, Amy E., Ft. Snelling.
Sheppard, Byron, Hutchinson.
Shol, Carolyn, Minneapolis.
Simmonds, Maurice, St. Paul.
Simpson, Charles D., West Concord.
Sinclair, Gregg M., Minneapolis.
Slade, Verna M., Minneapolis.
Smestad, Mattie H., Windom.
Smith, Kenneth H., Minneapolis.
Smith, LeRoy E., Renville.
Smith, Marian A., Minneapolis.
Sorenson, Ruth, Minneapolis.
Sorlien, Ella H., Granite Falls.
Sowden, Frank P., Sauk Centre.
Spaulding, Marjorie, Minneapolis.
Spencer, Julia, Henderson.
Stafford, Russell H., Minneapolis.
Staples, Alice M., St. Paul.
Staska, Joe, Angus.
Stearn, Harriet M., Minneapolis.
Stevens, Marion I., Minneapolis.
Strehlow, Lillian, Casselton, N. D.
Strong, Hazel M., St. Paul.
Strong, Ruth G., St. Paul.
Sullivan, Katherine, Stillwater.
Sumner, Louise M., St. Paul.
Sundby, Phil, Minneapolis.
Sunwall, J. Oscar, Minneapolis
Sutcliffe, Frederick H., Ft. Snelling.
Sutter, Hedwig M., St. Paul.
Sutton, Harris, Prior Lake.
Swanman, Ira C., Minneapolis.
Swanson, Stedy, Minneapolis.
Tallon, Maude M., Biwabik.
Terry, Florence, Minneapolis.
Thoen, Hazel V., Taylors Falls.
Thompson, Katherine G., Minneapolis.
Thompson, Nathan, Minneapolis.
Thomson, Margaret M., Minneapolis.
Tibbs, George M., Jr., St. Paul.
Tmey, Fred J., Hutchinson.
Tollefson, Dagna J., Rochester.
Tracy, Mabel, Minneapolis.
Trezona, Edith M., Ely.
Turnquist, Myrtle, Minneapolis.
Ulsaker, Oscar M., Wahpeton, N. D.
Underwood, Florence, Fergus Falls.
Utendorfer, Ray E., Gaylord.
Vaaler, Christopher, Spring Grove.
Van Valkenberg, Walter, Canby.
Van Vorst, Ada B., Paynesville.

Vaughan, Catherine, Minneapolis.
Vennemann, Rosalie, Ft. Snelling
Viesselman, Percival, Minneapolis.
Vollum, Alfred T., Hayward.
Walsh, Rose, St. Paul.
Warden, Lee M., Minneapolis.
Warmington, Leone, Dubuque, Ia.
Warner, Grace M., Minneapolis.
Wasmuth, Bjarne, Minneapolis.
Wasser, Opal L., Minneapolis.
Watson, Ralph, Minneapolis.
Way, Mildred R., St. Paul.
Webb, Philip M., Bismarck, N. D.
Webber, Dot N. L., Luverne.
West, David, Minneapolis.
West, Elizabeth C., Minneapolis.
Wheelock, Nellie, Minneapolis.
Wicklund, Effie, Bingham Lake.
Wilder, Earl R., Amboy.
Will, Tillie, Minneapolis.
Williams, Natalie, Minneapolis.
Williams, Perry S., St. Paul.
Wilson, Alta D., Reeder, N. D.
Winter, J. D., Minneapolis.
Wist, Lawrence, Webster, S. D.
Womack, Lillian, St. Paul.
Woodward, Ray, Minneapolis.
Woolley, Isla, Howard Lake.
Wyman, Vincent, Minneapolis.
Zeches, Georgia R., St. Charles.

UNCLASSED—203

Abbott, Roy, St. Peter.
Albrecht, Leila, Minneapolis.
Allen, Harriet, St. Paul.
Ames, Georgiana, Minneapolis.
Andrews, Mrs. M. E., Minneapolis.
Atterbury, Marie, Minneapolis.
Backus, E. R., Minneapolis.
Bailey, Katherine, Minneapolis.
Bailey, Lucretia, Minneapolis.
Barber, Marty, Minneapolis.
Barnum, Julia, Minneapolis.
Bartholf, Mrs. K. J., Minneapolis.
Barto, Alphonso V., White Earth.
Bauers, Gregory, Minneapolis.
Benton, Mrs. Elma, Minneapolis.
Berg, David E., Minneapolis.
Bieber, Louise, Aberdeen, S. D.
Bock, Sidney E., Minneapolis.
Bohn, Mary I., St. Paul.
Bright, Elizabeth, Minneapolis.
Brill, Harry H., Minneapolis.
Brown, Jessica M., Minneapolis.
Bruland, P. O., Norman, Ia.
Bryan, Agnes S., Rochester.
Bryant, Gordon, St. Paul.
Burke, Mrs. Julia, Minneapolis.
Burnett, Ralph A., Cummings, N. D.
Carling, Marion J., St. Paul.
Carson, Helen D., St. Paul.
Chapin, George, St. Paul.
Christ, Lydia B., Minneapolis.
Clawson, Leonard H., New Castle, Ind.
Clefton, C. C., St. Paul.
Colburn, O. A., Minneapolis.
Constant, Mrs. F. H., Minneapolis.
Cornish, Mary, Vernon Center.
Curial, Atwater T., Anoka.
Darrow, Mabelle C., Minneapolis.
DeMarais, Lucille, Minneapolis.
DeVeau, James, Jr., Minneapolis.
Dobbs, Claire, Minneapolis.
Doherty, F. C., Tracy.
Doolittle, Madeleine, Minneapolis.
Door, Lester A., Mankato.
Dorn, Mrs. Helena, St. Paul.
Douglas, Leila, St. Paul.
Downey, Mrs. Hal., Minneapolis.
Downing, H. L., Minneapolis.
Ecklund, Jule A., Minneapolis.
Edgerton, Lou, Yankton, S. D.
Edwards, Mary, Minneapolis.
Emerson, Hazel, Minneapolis.
Eustacia, Sister, Duluth.
Evenson, Fred G., St. Paul.
Ferguson, Ida M., Minneapolis.
Ferrey, Marjorie, St. Paul.
Firestone, Emma A., Mankato.
Fleming, Beryl, St. Paul.
Flom, Otto, Belview.
Foley, Marcella D., Minneapolis.
Foster, George K., St. Paul.
Frary, Mrs. Alice W., Minneapolis.
Freeman, Vernon, Minneapolis.
Garland, Nathan R., Minneapolis
Gaus, Ottelie, Minneapolis.
Georgian, A., Caucasus, S. Russia.
Gertrude, Sister, Duluth.
Gilbertson, J. L., Minneapolis.
Goff, Belle, Minneapolis.
Goodrich, Donald, Minneapolis.
Granner, John P., Minneapolis.
Gray, Amy M., Valley City, N. D.
Gueffroy, H. A., White Rock, S. D.
Gutgesell, Hazel, Minneapolis.

Hake, O. W., St. Paul Park.
Hall, Arthur B., Minneapolis.
Hall, Bruce P., Minneapolis.
Hall, Margaret, St. Paul.
Hallinan, Mary, Minneapolis.
Handy, Georgia M., Minneapolis.
Hanggi, John A., St. Paul.
Hanson, Lillian, Morris.
Hart, Kathleen P., Mankato.
Hartgering, Genevieve, Minneapolis.
Harwood, Evelyn, Minneapolis.
Hedtke, Anna E., Henderson.
Heeter, E. E., Manchester, Ind.
Helgerson, Lynn S., Plainview.
Herrick, Lydia, Michigan City, Ind.
Herrick, William, Michigan City, Ind.
Hitchcock, Elizabeth, Redwood Falls.
Hobe, Ragnhild J., White Bear.
Hoefling, Neoma, Mitchell, S. D.
Hoidale, Margaret, Dawson.
Holbrook, David H., Minneapolis.
Holzschuh, Alma, Minneapolis.
Horton, Gilbert R., Litchfield.
Hovey, Frankie, Minneapolis.
Hubbard, William A., Minneapolis.
Huey, George, Minneapolis.
Humes, Dorothy, Cass Lake.
Hvid, Lillian, Minneapolis.
Jaynes, Irene, St. Paul.
Johnson, Ada F., Benson.
Johnson, Mrs. Mary F., Minneapolis.
Johnson, Odin J,, Lyle.
Johnson, Tord, Fergus Falls.
Jones, Charles H., Mitchell, S. D.
Kawata, Suehito, Kyoto, Japan.
Keefe, A. Percy, Minneapolis.
Kellogg, Helen, Minneapolis.
Kent, Fay, Minneapolis.
Kenyon, R. H., Minneapolis.
Kingsley, Kenneth, Minneapolis.
Klapp, Louise D., Minneapolis.
Knight, Mary, Minneapolis.
Koyama, Kozo, Minneapolis.
Krogh, Gudrun, Aberdeen, S. D.
Kueffner, Wm. R., St. Paul.
Larsen, Kathryn, Minneapolis.
Lasher, Lois B., Montevideo.
Laughlin, Elmer B., Tracy.
LaVayea, Florence, Minneapolis.
Lawler, Sturgis, St. Paul.
Lawrence, James G., Wabasha.
Libby, Howard C., New London, Wis.
Lillis, John H., Davenport, Ia.
Lindquist, Oscar F., Starbuck
Little, Helen M., Minneapolis.
Loberg, Nellie, Minneapolis.
Lothrop, Mary O., Minneapolis.
Lovejoy, Marjorie, Minneapolis.
Lyford, Dartt H., St. Paul.
Lyon, Marion S., Minneapolis.
MacCourt, Robert S., St. Paul.
MacDermott, Leila, Minneapolis.
McLennan, Eleanor, Minneapolis.
McMillan, Jean, Minneapolis.
Markoe, Arthur, Minneapolis.
Mielke, Wilhelmina, Lonsdale.
Miller, Nina, Minneapolis.
Moes, Lillian, Minneapolis.
Moir, Arthur D., Minneapolis.
Moore, Robert R., St. Paul.
Morris, Marie E., Barron, Wis.
Nehls, Mrs. Marie, Minneapolis.
Nelson, Elizabeth, Minneapolis.
Nelson, Nan, St. Paul.
Nichols, Florence E., Minneapolis.
Nordbye, Gunnar H., Granite Falls.
Oak, Emma J., Hot Springs, S. D.
Olson, Lydiana J., Minneapolis.
Oredalen, Mary, Kenyon.
Ostlund, Haddon A., Minneapolis.
Parmele, Margaret, Minneapolis.
Pattee, Dorothy, Minneapolis.
Pepper, Dorothy S., Minneapolis.
Phillips, Mary Grace, Minneapolis.
Porter, Albert G., Willmar.
Powers, Harry W., St. Paul.
Prentice, Ruth E., Minneapolis.
Pressey, Sidney L., St. Paul.
Prosser, Clare C., Minneapolis.
Puffer, Lottie S., Guelph, N. D.
Pullen, D. S., Minneapolis.
Purple, Margaret, Minneapolis.
Ramsland, O., Sacred Heart.
Rarig, Bessie M., Minneapolis.
Raudenbush, Henrietta, St. Paul.
Relf, Frances H., St. Paul.
Remund, Laura, Waseca.
Riebeth, Chester, Minneapolis.
Rinde, Nicholas N.
Roberts, Marie, Minneapolis.
Robinson, Henrietta M., Zumbrota.
Rodeen, Charles, Minneapolis.
Rosholt, Norma, Minneapolis.
Ross, Lillian, Pekin, Ill.
Rushfeldt, Elise, Hawley.
Sawanobori, George, St. Paul.
Schoen, Vera, Minneapolis.
Schonlan, Clement, Houston.
Schow, Jennie E., Minneapolis.
Schulte, Anna M., Minneapolis.

Scott, Marguerite M., Elk River.
Sherwood, Rachel, Minneapolis.
Silloway, Sarah, Minneapolis.
Simpson, Jean, Minneapolis.
Smith, Chauncey G., Superior, Wis.
Smith, Margaret, St. Cloud.
Smith, Mrs. Marie S., Minneapolis.
Sommermeyer, Louise W., Minneapolis.
Sorlien, Theodore, Granite Falls.
Spies, A. Agnes, Graettinger, Ia.
Spies, Marie E., St. Paul.
Stevens, Marjorie P., St. Paul.
Stokes, Ralph S., St. Paul.
Stone, Philip M., Morris.
Stub, Ingolf, St. Paul.
Sullivan, Frank J., St. Cloud.
Sullivan, Henry H., St. Cloud.
Tenner, Mrs. Dora, Minneapolis.
TerLouw, William, Pella, Ia.
Thompson, Ida B., Grandy.
Thuras, Albert, Minneapolis.
Tideman, C. G., St. Paul.
Tomlinson, Bessie A., Minneapolis.
Traxler, Marion, Minneapolis.
Trenerry, Mabel E., Hibbing.
Tribbey, Ruth E., Minneapolis.
Trimble, Alice, Minneapolis.
Turner, Alice M., Minneapolis.
Underhill, R. H., Stillwater.
Underleak, Bessie, Chatfield.
Van Etten, Gerard, Minneapolis.
Voelker, James M., Winona.
Wagner, Archibald F., Minneapolis.
Walle, Marguerite E., St. Paul.
Walter, Wilmot, Sioux Falls, S. D.
Warner, Amos E., St. Paul.
Webster, Florence P., Minneapolis.
Weller, Mildred L., Minneapolis.
Wheeler, H. Meryl, St. Paul.
White, Hope, Winnebago.
Wilk, Harry, Minneapolis.
Wilkinson, Eva M., Minneapolis.
Williams, Clarence, Minneapolis.
Willis, Hazel M., Minneapolis.
Winsted, Huldah L., Valley City, N. D.
Witchie, Leila, Minneapolis.
Witte, Fred W., Sioux Falls, S. D.
Wood, Stella, Minneapolis.
Young, Arthur D., Mankato.
Young, Edith, Shawnee, Okla.
Zellar, Enza, St. Paul.

The College of Engineering and the Mechanic Arts

SENIOR CLASS—72

CIVIL ENGINEERS—17

James A. Childs, St. Paul.
Jay, T. Ellison, Monticello.
William Elsberg, Minneapolis.
Frank F. Esser, Ellsworth.
F. Wm. Fiske, Jr., St. Paul.
Fred. A. Hubbard, Minneapolis.
Henry A. Hubbard, Spencer, Ia.
Simon Ingberg, Hendrum.
Robert Jaques, Duluth.
Lawrence W. King, Minneapolis.
John B. Mitchell, Minneapolis.
Edward S. Nelson, St. Paul.
Frederick T. Paul, Minneapolis.
Fred W. Sheffield, Crookston.
George M. Shepard, Kenyon.
Samuel A. Siverts, Morris.
Eli Torrance, Minneapolis.

MECHANICAL ENGINEERS—21

Charles B. Berry, Minneapolis.
John B. Bieri, Minneapolis.
Zingel, Birnberg, St. Paul.
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John E. Buhl, Graceville.
Donald M. Forfar, Minneapolis.
Charles E. Holmgren, Breckenridge.
Frank J. Kircher, Hudson, Wis.
George A. Kircher, Hudson, Wis.
William R. Knopp, St. Paul.
Edwin M. Lambert, Young America.
Walter J. Mark, St. Paul.
John E. Morris, Minneapolis.
Malcolm B. Moyer, Minneapolis
Frank L. Nemec, Montgomery.
Willis Shippam, Minneapolis.
William H. Souba, Hopkins.
Howard M. Starrett, Minneapolis.
Carl D. Udell, Minneapolis.
Wilbur S. Williams, Minneapolis.
Harris H. Wright, Minneapolis

ELECTRICAL ENGINEERS—29

Walter C. Beckjord, St. Paul.
Alvah E. Brockway, Luverne.
Rollo J. Cobban, Luverne.
Louis M. Converse, St. Paul.
Ralph M. Davies, Minneapolis.
Joel A. Fitts, Minneapolis.
Frank R. Fleming, St. Paul.
Lester H. Gadsby, Minneapolis.
Fred R. Grant, Windom.
Clayton Harris, Minneapolis.
Albert J. Hitzker, Winona.
Mark L. Hopkins, Minneapolis.
James W. Hornibrook, Tower.
Barney G. Japs, Hopkins.
Herman R. Johnson, Minneapolis.
Eugene V. Kaplan, Owatonna.
George A. Kruschke, Duluth.
Charles G. Lindelef, Rush City.
Lauren F. McKenzie, Glencoe.
Frederic E. Murrish, Minneapolis.
Orson B. Poore, Bird Island.
James W. Powles, St. Paul.
Archer R. Robinson, Windom.
Marcus H. Stillman, Austin.
Milo E. Todd, Minneapolis.
Leslie E. Turner, Minneapolis.
Theodora Vita, New Prague.
Benjamin B. Walling, Chicago, Ill.
Fred. M. Williams, Minneapolis.

MUNICIPAL ENGINEERS—1

Sidney R. Oakes, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Charles P. Clarke, Elysian.
Lindsley B. Curtiss, Minneapolis.
Arthur B. Fruen, Minneapolis.
Arthur O. Olsen, Minneapolis.

JUNIOR CLASS—81

CIVIL ENGINEERS—27

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Hans Asleson, Minneapolis.
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Otto E. Brownell, Ely.
Berton L. Chapman, Westbrook,
Philip L. Dahlquist, Minneapolis.
J. Walter Dickinson, St. Paul.
Chas. T. Eckman, St. Paul.
Herbert C. Frahm, Rochester.
Conrad G. Fredin, Duluth.
George M. Garen, Minneapolis.
James R. Graham, Fort Worth, Texas,
Rupert V. Hauser, St. Paul.
George W. Jevne, Minneapolis.
Edward W. Leach, Winona.
Edward D. Macmillan, Minneapolis.
Reuben Mark, St. Paul.
Lewis H. Merrill, Hutchinson.
Clyde Methven, Minneapolis.
C. Foerster Meyer, Minneapolis.
Charles L. Mote, Alpha.
George Nason, St. Paul.
Emerson D. Sawyer, Minneapolis.
Ernest Schluter, Hutchinson.
Adolph Sommerfeld, Sleepy Eye.
Wm. D. Timperley, Minneapolis.

MECHANICAL ENGINEERS—24

Armin G. Albrecht, St. Paul.
Wm. B. Atkinson, Barnesville.
John C. Bush, Minneapolis.
Fred R. Comb, Minneapolis.
Robert A. Cone, Minneapolis.
H. C. Cook, Red Wing.
George Du Toit, Minneapolis.
Laurence T. Fleming, Minneapolis.
Jenness B. Frear, Wayzata.
Ole H. Gierberg, Red Lake Falls.
Frank Johnson, Minneapolis.
Martin S. Larson, Red Wing.
Wallace H. Martin, Willmar.
Bernard A. Meixner, Owatonna.
Paul A. Mencke, St. Paul.
Amos F. Moyer, Montevideo.
Browning Nichols, Jr., Montevideo.
Oscar A. Olstad, Minneapolis.
Harley G. Overholt, Minneapolis.
Maynard W. Pease, Minneapolis.
Willis R. Salisbury, Minneapolis.
Martin Tolstad, Starbuck.
Alvah H. Warren, St. Paul.
Donald M. Wesbrook, Minneapolis.

ELECTRICAL ENGINEERS—28

Oscar P. Anderson, Wells.
Oscar V. Anderson, Hudson, Wis.
Roy H. Ashworth, Mankato.
Vernon S. Beck, Minneapolis.
Wilfred E. Conley, Lake Mills, Ia.
Raymond E. Dahlstrom, St. Paul.
Leon R. Drinkall, Spring Valley.
Raymond V. Duffy, Kalispell, Mont.
Walter J. Finke, Charles City, Ia.
Earl L. Grinols, Minneapolis.
Herbert E. Hagstrom, Minneapolis.
Christian Hansen, St. Paul.
Byron P. Hustad, Minneapolis.
Clarence M. Jesperson, Minnetonka Beach.
Leonard T. Johnson, Minneapolis.
Eliot B. Josephson, Red Wing.
Arrid G. Landeen, Garfield.
Phiney O. Larson, Fosston.
Jesse I. Layman, Minneapolis.
C. Hugo Nelson, Minneapolis.
Henry H. Peterson, Monticello.
Ray R. Phelps, St. Paul.
Harry A. Reid, Mankato.
Ernest E. Skythe, St. Paul.
Joseph H. Soulek, Montgomery.
Henry G. Stahlmann, St. Paul.
Lester A. Stoner, Minneapolis
Theodore Swenson, St. Paul.

MUNICIPAL ENGINEERS—1

Alfred H. Moe, Duluth.

SCIENCE AND TECHNOLOGY—1

Hadwen C. Barney, Minneapolis.

SOPHOMORE CLASS—118

CIVIL ENGINEERS—43

John W. Adams, Jr., St. Paul.
Arthur F. Ainslie, Rochester.
Sidney S. Alvin, New Ulm.
Herbert P. Armesen, Benson.
Wm. H. Bailey, Minneapolis.
Frank C. Boermer, Duluth.
Thomas J. Buhl, Graceville.
Will P. Cottingham, Minneapolis.
Edward D. Coughlan, Mankato.
George E. Crokard, Britton, S. D.
Ernest B. Croft, Mnneapolis.
Thomas H. Curtis, Fairmont.
Axel E. Elfstrom, Willmar.
Edward H. Euger, Minneapolis.
Walker Ferguson, Mankato.
David Fieldman, Duluth.
August L. Flygare, Winthrop.
George Fossen, Ferguson Falls.
Marion H. Goodnow, Minneapolis.
Kenneth D. Hauser, St. Paul.
Ralph M. Hodnett, St. Paul.
Michael J. Hoffman, St. Paul.
Wm. Raleigh Hosfield, Faribault.
Karl L. Hullsiek, St. Paul.
C. Arthur Johnson, Minneapolis.
Paul Johnson, Minneapolis.
Rolland A. Judson, Crookston.
Ingwald, Kirtrud, Minneapolis.
Robert L. Latham, Minneapolis.
Howard C. Libby, New London, Wis.
George A. Maney, Minneapolis.
George C. Mattison, Minneapolis.
Benjamin A. Pratt, Minneapolis.
Alfred G. Ranney, St Paul.
Lewis M. Roth, St. Paul.
Irving H. Russell, Minneapolis.
Sigvel J. Siverson, Minneapolis.
Sidney H. Smith, Mitchell, S. D.
Randall, D. Stanton, St. Paul.
William B. Tuttle, Minneapolis.
Arthur C. Walby, Minneapolis.
Benjamin O. Wold, Barron, Wis.
Henry E. Wolff, St. Paul.

MECHANICAL ENGINEERS—19

Marvin C. Barnum, Minneapolis.
Ira L. Bishop, Mapleton.
Harry S. Bronson, St. Paul.
William P. Brown, Yankton, S. D.

George Christensen, Robbinsdale.
Vernon G. Dickey, Princeton.
Julian P. Farnam, Minneapolis.
Ralph M. Hoffman, Minneapolis.
Walter F. Kasper, Owatonna.
James C. Markoe, St. Paul.
Robert C. Oran, Willmar.
Leo E. Owens, Minneapolis.
Porteus B. Palmer, St. Paul.
Lars Rand, Minneapolis.
Lester M. Sears, Minneapolis.
Jack Sneve, St. Paul.
Russell W. Watrous, St. Paul.
Guy L. Willits, Minneapolis.
Joseph C. Woodman, Minneapolis.

ELECTRICAL ENGINEERS—51

Arthur R. Anderson, Willmar.
Fred A. Andert, Morris.
Earl M. Bill, Minneapolis.
Peter P. Bisek, New Prague.
George W. Blossom, Minneapolis.
Herbert Brunkow, Delano.
Robert P. Burrows, St. Paul.
Allan C. Butterworth, Minneapolis.
Ernest F. Carpenter, Redwood Falls.
J. Philip Carson, St. Paul.
Sprague L. Chapin, Luverne.
Arthur G. Chapman, Minneapolis
Charles S. Chapman, Lanesboro.
Charles S. Demarest, Minneapolis.
Albert P. Dorrance, St. Paul.
Lynn A. Emerson, Elmore.
Benjamin Ferriss, St. Paul.
Peter W. Forsberg, Minneapolis.
Harry Frederickson, Minneapolis.
Milton L. Guderian, Alexandria.
Walter B. Anderson, Minneapolis.
Maurice J. Hansen, Hopkins.
Fred W. Wjelm, Minneapolis.
Herbert Huevelmann, New Ulm.
Howard R. Hush, Minneapolis.
George W. Hyser, Minneapolis.
Henry C. James, St. Paul.
John Ewald Johnson, Minneapolis.
William C. Koch, St. Paul.
John P. Lane, Minneapolis.
Roy P. Lutzi, Minneapolis.
Ira C. McCoy, Rochester.
C. Elliott Magraw, St. Paul.
Oscar Markuson, Fertile.
Albert H. Mittag, Elizabeth.
Walter H. Nebel, Braham.
Fred C. Nelson, Chatfield.
Raymond J. O'Brien, St. Paul.
Joseph H. Pengilly, Osseo.
James C. Peterson, Elbow Lake.
Leland E. Purves, Eyota.
Clyde Richely, Minneapolis.
Louis F. Riegel, Rochester.
William G. Shane, Gladstone.
Fred R. Stinchfield, Robbinsdale.
Will V. Stinson, Minneapolis.
Harry C. Striech, Winona.
William A. Walker, Moorehead.
Harvey E. Webb, Aberdeen, S. D.
Glenn Wilson, Dover.
Charles N. Young, St. Paul.

MUNICIPAL—1

Hal R. West, Minneapolis.

SCIENCE AND TECHNOLOGY—4

Joseph S. Bookwalter, Minneapolis.
Paul E. Klopsteg, Henderson.
Frank J. Robischon, Sauk Centre.
Christian B. Thvedt, Minneapolis.

FRESHMAN CLASS—155

CIVIL ENGINEERS—55

Arthur E. Anderson, Goodhue.
Harvey B. Anderson, Hopkins.
Thomas W. Bernard, Minnetonka Beach.
John Bathhurst, Minneapolis.
Wm. J. Bingen, Webster, S. D.
George H. Boland, St. Paul.
Arthur D. Cambell, Anoka.
William N. Carey, St. Paul.
Harold S. Chapin, St. Paul.
Edward G. Chilton, Frazee.
Elmer F. Cummings, Luverne.
Robert E. Cummings, St. Paul.

Allan H. De Wolf, Bonners Ferry, Idaho.
Grover W. Dimond, Minneapolis.
Frank A. Donaldson, Rochester.
Harry Edwards, St. Paul.
Robert A. Fruen, Minneapolis.
Ernest A. Gatje, Rochester.
Marcus Giersten, Minneapolis.
Edward L. Haberle, Minneapolis.
Frederick W. Hoorn, Red Wing.
Robert D. Jorgens, Minneapolis.
Raymond J. Kapphahn, Brandon.
Frank Kaufman, St. Paul
Charles R. Knox, Fairmont.
Joseph J. Kriz, Hopkins.
Ralph B. Lake, Fergus Falls.
Laurence La Plant, Anoka.
John A. McCree, St. Paul.
William E. McCrum, Thief River Falls.
Dale R. McEnary, Minneapolis.
William J. McHale, Preston.
Rufus H. Milne, Crookston.
Clarence C. Pagenhart, Rochester.
Carl H. Parks, Montivideo.
Raymond A. Pease, Minneapolis.
Roland O. Peteler, Minneapolis.
Barney J. Peterson, Alvarado.
Conrad N. Peterson, Lyle.
Hewitt Richmond, Minneapolis
Chester F. Robbins, Verndale.
James W. Routh, Duluth.
Loiel S. Ryan, Little Falls.
John S. Siverts, Morris.
Niels C. Sorenson, Monticello.
Willard A. South, Blue Earth.
M. Edwin Souther, Colman, S. D.
Norman H. Stevens, St. Paul.
Hjalmer S. Swenson, Willmar.
Irving E. Torgerson, Lanesboro.
Grover Umbehocker, Princeton.
Reginald Van Cleve, Minneapolis.
Oscar H. Wangaard, Minneapolis.
Arthur Welin, Argyle.
George R. Zieske, Sleepy Eye.

MECHANICAL ENGINEERS—34

Fred C. Acomb, Minneapolis.
Laurence D. Barnard, Minneapolis.
Eugene C. Becker, Hope, N. D.
Ernest W. Bolingren, Minneapolis.
James S. Brodie, St. Paul.
Eugene C. Crane, Minneapolis.
Earl M. Darraw, Minneapolis.
Arthur T. Dinsmore, Minneapolis.
Willis F. Geib, St. Paul.
Warren W. Getchell, Minneapolis.
Charles F. Haglin, Jr., Minneapolis.
Leon R. Hartman, Minneapolis.
Raymond M. Helm, Rockford, Ill.
Arthur C. Hubbell, St. Paul.
John Huseby, Cloquet.
Milton W. Johnson, Stillwater.
Clifford N. Lockwood, Chaska.
Guy A. McGlone, Minneapolis.
Charles L. Melvin, Moline, Ill.
Martin A. Mikesh, Spillville, Ia.
Clinton K. Moore, Minneapolis.
Harold S. Morton, Minneapolis.
George M. Orr, Afton.
Paul S. Parker, Minneapolis.
Sydney, A. Patchin, Rochester
Emil Ruemmele, Hudson, Wis.
Bert. R. Sansen, Taylors Falls.
Newell E. Storms, Minneapolis.
Harold H. Sullwold, St. Paul.
Ernest M. Tollefson, Minneapolis.
Frederick Layton Tooker, St. Paul.
Harold E. Wade, Fairmont.
Carlyle D. Weston, Minneapolis.
Wm. Albert Yunker, Hecla, S. D.

ELECTRICALS—66

John Arthur Anderson, Hinckley.
Samuel Lee Avis, Jamestown, N. D.
Neil M. Bain, Albany, Ore.
Carl Beede, Minneapolis.
Claude F. Benham, St. Paul.
Eugene F. Bennett, Preston.
Byron H. Bradley, Hudson, Wis.
William E. Brewster, Minneapolis.
Hal E. Brown, Duluth.
Edward S. Byron, Minneapolis.
Paul K. Cesander, Buffalo.
William G. Clark, Stillwater.
Claude C. Clifton, St. Paul.
Allen S. Crawford, Rochester.
Elmer E. Daniels, Pine Island.
Henry Arno Daum, Albert Lea.
Richard M. Falley, Wahpeton, N. D.
Albert E. Fischer, Canby.
William H. Fischer, Winona.
Milton M. Goldstein, Minneapolis.
Mark Grady, Foley.
Erraid C. Green, Minneapolis.

Wm. Hecklesmiller, Ellendale, N. D.
Ernest A. Hedenstrom, St. Paul.
Raymond Herrmann, Henderson.
C Kirk Hillman, St. Paul.
Vern T. Hohans, Winona
Conrad G. Hoveden, Perley.
John A. Hunt, Pine City.
Luther E. Hyde, St. Paul
Wm. H. Jensen, Browns Valley.
Harry Johnson, Red Wing.
Harold W. Keith St. Paul
Lester H. Knapp, Big Lake.
George La Vayea, Jr., Minneapolis.
Claude E. Leak, Brainerd.
Donald R. Loper, Minneapolis.
Robert C. Mather, Morton.
Elmer W. Merril, Minneapolis.
Karl J. Mertz, Hastings.
Albertis Montgomery, Minneapolis.
George A. Nelson, Anoka.
Thomas C. O'Connell, Ihlen.
Arthur J. Ogaard, International Falls.
Charles A. Pardee, Minneapolis.
Guy Parkin, Pine Island.
George D Patterson, Minneapolis.
Andrew M. Peterson, St. Paul.
Milo A. Phillips, Minneapolis.
Theodore D. Ramm, Winona.
Ray L. Reed, Slayton.
John Rehder, Red Wing.
Cyrus K. Rickel, Minneapolis.
Elmer H. Smith, Minneapolis.
Ralph B. Spear, Faribault.
George E. Strong, St. Paul.
Lyman D. Taylor, Duluth.
Jesse L. Thompson, St. Paul.
Frederic C. Toomey, St. Paul.
Neal C. Towle, Minneapolis.
Frank E. Wales, Welcome.
Riese A. Walker, Ellendale, N. D.
Earle A. Weichelsbaum, Excelsior.
Ralph D. Whitney, Princeton.
Leslie W. Wilcox, Hancock.
Gust E. Wingreene, Minneapolis.

UNCLASSED—41

Herbert C. Alden, Minneapolis.
John W. Camp, Wayzata.
Ray L. Cooper, Britton, S. D.
George Cottingham, Minneapolis.
Llewelyn G. Couter, St. Paul.
George A. Darby, Minneapolis.
Clarence Dow, Minneapolis.
Alexander Elston, Minneapolis.
John J. Flaherty, St. Paul.
Walter Griffin, Robbinsdale.
Erick G. Holden, Sioux Falls, S. D.
Fred G. Holliday, Minneapolis.
Lynn R. Johnson, Benson.
Ray H. Kenyon, Minneapolis.
Aloysius Krauser, Minneapolis.
Glenn H. Lamphear, Minneapolis.
Dartt H. Lyford, St. Paul.
Howard W. McClure, Litchfield.
William H. McGinnis, Minneapolis.
Jason A. McLeod, Lake City.
J. Elmer MacMullan, Minneapolis.
Stanton G. Mooney, Minneapolis.
Clarence F. Nagle, Preston.
Martin J. Orbeck, Eau Claire, Wis.
Robert A. Pratt, Minneapolis.
Richard J. Purcell, Minneapolis.
Ivan G. Ringstrom, Wheaton.
Bertram H. Rogers, Minneapolis.
West A. Rolfe, Ada.
Neil T. Ronan, Lewiston.
Harold C. Sather, Lewiston.
Eldreth L. Sawyer, Minneapolis.
Carl W. Schroader, Minneapolis.
J. Allyn Scott, West Duluth.
William D. Shipman, St. Paul.
Webster H. Stone, Alden.
Hugh W. Sudor, St. Paul.
M. Roy Swedberg, Luverne
Herbert L. Thompson, Hokah
Frederick E. Tydeman, Montevideo.
Harold Worcester, Minneapolis.

Total enrollment..................467

The College of Agriculture

POST GRADUATES—6

CANDIDATES FOR MASTERS DEGREE. AGRICULTURE

Gaumnitz, Carl, St. Cloud
Grout, G. P., St. Anthony Park
Howell, D. B., St. Anthony Park
Metcalf, Isaac F., Buford, Ontario

CANDIDATES FOR BACHELORS DEGREE FORESTRY

Clark, Stephen G., Stillwater
Deering, Robt. L., Minneapolis.

SENIORS—25

Arny, Albert C., St. Anthony Park
Baker, George J., St. Paul.
Bergstrom, Chester H., Minneapolis.
Carroll, Harry B., Jr., St. Paul.
Crandall, LeRoy V., Red Wing.
Donovan, Raymond L., Dundas.
Frear, Dana W., Minnetonka.
French, Anna May, Minneapolis.
Gore, John E., San Dimas, Cal.
Hartzell, Mary K., Minneapolis.
Hillman, Frank M., Minneapolis.
Hohle, Ola A., Hector.
Knowlton, Edith V., Minneapolis.
McNelly, Chester L., Caledonia.
Marsden, Edith Viola, Edgerton, Wis.
Mayland, Edwin, Rushford, R. 3.
Miller, Ralph C., Sta. F. R. 1, Minneapolis.
Moore, Walter M., St. Paul.
Orr, George Raymond, Michigan City, Ind.
Paterson, Thomas G., Wayzata.
Peterson, Elvin L., Olivia.
Pond, Harold H., Sta. F. R. 1, Minneapolis.
Potter, Alden A., Minneapolis.
Ware, John F., St. Paul.
West, Ralph L., Grand Rapids.

JUNIORS—12

Benson, Arnold O., Glenwood.
Benzin, Basil, Minneapolis.
Berry, J. Bert, St. Paul.
Crimmins, Ellen M., Minneapolis.
Gaumnitz, Florence, St. Cloud, R. 1.
Jacobson, Norman, Port Washington, Wis.
Krauch, Herman, St. Paul.
Laate, Gurid, St. Anthony Park.
Lewis, Charles L., Jr., St. Paul.
Merrill, Alfred S., Minneapolis.
Underwood, Clarence, Hutchinson.
Waller, Conrad J., St. Paul.

SOPHOMORES—45

Arrivee, David A., St. Paul.
Baker Norman M., Davenport, Ia.
Bilsborrow, James D., Wolverton.
Brewster, Donald R., Minneapolis.
Bryan, Wm. J., Red Wing R. 2.
Christopherson, Edna H., Sioux Falls, S. D.
Collin, William H., Northwood, Ia.
Crysler, Flossie W., Sioux Falls, S. D.
Dvorachek, Henry E., Glencoe.
Erickson, Richard E., Stillwater.
Evans, Hannah Vaughn, Tracy.
Forsman, John A., Duluth.
Gilbertson, Henry W., Jasper.
Gillis, James R., St. Anthony Park
Glotfelter, Madge L., Minneapolis.
Hagerman, Wm. F., Morris.
Hamilton, Carl L., Minneapolis.
Hartzell, Dorothy, Minneapolis.
Hauge, Adolph G., Albert Lea.
Haw, John W., St. Anthony Park.
Hayford, Ruth, Minneapolis.
Hofmann, Julius V., Janesville.
Howard, Leola M., Rochester.
Johnson, Fred O., St. Anthony Park
McElmeel, Stephen P., St. Paul.
Matthews, Charles A., Ortonville.
Miles, Lee O., West Concord.
Nash, Malcolm A., Tracy.
Noble, William E., Albert Lea.
Older, Frank E., Luverne.
Peterson, Roy M., Olivia.
Pie, Richard M., Cannon Falls.
Rowe, Bess M., Minneapolis.
Rust, Jay B., St. Paul.
Sargeant, Forrest H., Red Wing, R. 2.
Strong, Florence S., St. Paul.
Thompson, Mark J., Winsted.
Tolaas, Arne G., St. Paul.
Uptegrafft, Leroy, St. Anthony Park.
Vancura, Edward, Lakefield.
Weber, Henry G., Minneapolis.
White, Frank W., Excelsior.
Williams, Donald T., Minneapolis.
Williams, Ruth J., St. Louis Park.
Young, John P., St. Paul.

FRESHMEN—104

Adams, Emma T., Owatonna.
Arrivee, Agnes E., St. Paul.
Aust, Clara L., Minneapolis.
Beard, Frank W., St. Anthony Park.
Berg, Joseph H., Willmar.
Berkey, Andrew D., St. Paul.
Beyer, Walter F., St. Paul.
Billings, Carlos R., Audubon.
Blodgett, Harvey P., St. Paul.
Bohn, George J., St. Paul.
Bowen, Clarence W., Minneapolis.
Brandt, Henry P., Morris.
Branyen, Wm. H., Minneapolis.
Brazell, Clarence A., Tacoma, Wash.
Brooks, Elizabeth F., Grand Rapids.
Brownlie, James R., Davenport, Ia.
Buhler, Ernest O., St. Anthony Park.
Bush, Harvey M., Minneapolis.
Cameron, Gladys M., St. Paul.
Campbell, Hugh B., Stillwater.
Carpenter, Paul J., Sleepy Eye.
Chase, Alice K., Fergus Falls.
Chase, Arthur G., Minneapolis.
Chase, Ethel E., Minneapolis.
Clark, Miles D., St. Paul.
Clymer, William R., St. Paul.
Coffin, Clinton, Minneapolis.
Conzet, Grover M., Nevis.
Cornlea, Francis A., Plato.
Danish, Samuel, Minneapolis.
Dieh, Winn J., Omaha, Neb.
Donovan, Harold T., Stillwater.
Dvorachek, Daniel C., Glencoe.
Elwell, Georgia Belle, Minneapolis.
Morton, Agnes, Elmwood, Ill.
Mueller, Martha J., St. Paul.
Norman, Sigvald, Ortonville.
Norsen, Knute, St. Anthony Park.
Olson, Andrew J., Renville.
Oppel, Arthur F., Fulda.
Orr, John E., Michigan City, Ind.
Peake, George W., Eagle Bend.
Pearce, William R., Minneapolis.
Peck, Francis W., St. Anthony Park.
Peterson, Ralph W., Olivia.
Pickett, Tressa A., Chatfield.
Punderson, James M., St. Paul.
Records, Percy C., Farmington.
Regan, Mabel E., St. Paul.
Rice, Maude B., Windom.
Rich, George S., Minneapolis.
Ricks, Nelson D., Minneapolis.
Savre, Oliver M., Northwood, Ia.
Emerson, Robert C., West St. Paul.
Erickson, Richard E., Stillwater.
Field, Edmund T., Minneapolis.
Francis, Llewellyn H., Hutchinson.
French, Clarence L., St. Paul.
Gage, Richard C., Minneapolis.
Gleason, Clara T., Minneapolis.
Harris, S. Grant, Jr., St. Paul.
Hart, Bernice, Minneapolis.
Hobbs, Fowler K., Minneapolis.
Hodgman, Arthur W., St. Paul.
Hopkins, Rachael, Sta. F., R. 1. Minneapolis.
Horn, Charles L., Ida Grove, Ia.
Husby, John, McIntosh.
Ireland, Max A., Minneapolis.
Johnson, Lloyd K., Wabasha.
Jordan, Philip S., Minneapolis.
Josephson, Elvira, Minneota.
Josephson, Victor, Minneota.
Kenety, William H., Fulda.
Lawson, Elsie, Anoka.
Lees, Frank B., Minneapolis.
Lewis, Pauline L., Long Lake.
Lewis, Rhoda, St. Paul.
Lydiard, Susie C., Long Lake.
McIntosh, Marguerite F., St. Paul
McNamee, Ruth, Helena, Mont.
Magraw, Charles E., Jr., St. Paul.
Mather, Wm. S., Groton, S. D.
Marthinson, Norman O., Austin.
Martin, Dean W., Minneapolis.
Merrill, Frederic B., Stillwater.
Moffat, Frederic R., Dubuque, Ia.
Schwedes, Carl H., Wabasha.
Shannon, Wm. M., Bemidji.
Shaughnessy, Clark D., N. St Paul.
Smith, Stella H., Austin.
Spellerberg, Frederick E., Dubuque, Ia.
Stevenson, John A., Minneapolis
Stewart, Charles D., Sherburn.
Sturges, Paul E., Buffalo.
Swedberg, Jasper I., White Bear.
Todhunter, Roxie E., Hamilton, O.
Taylor, Ruth, Pipestone.
Valleau, William D., St. Anthony Park.
Vancura, Edward W., Lakefield.
Voelker, James M., Winona.
Werner, Henry, Fulda.
Wilson, Robert, Stillwater.
Wise, Kate A., Minneapolis.
Youngren, Fridolph N., Minneapolis.

The School of Agriculture

STUDENTS—1908-9

Intermediate year	7	
A Class	108	
B Class	171	
C Class	368	
		654
Teachers' Summer School	90	
Summer Forestry School	18	
Farmer's Short Course	169	
Dairy School	107	
Crookston School of Agriculture	101	
College course	192	
Total in Department of Argiculture	1,331	
Less thirteen duplicates	13	
TOTAL		1,318

INTERMEDIATE CLASS—7

Corser, Frederick, Minneapolis.
Dorn, Ivan C., Robbinsdale.
Harrison, Earl D., Osseo, R. 1.
Lane, George E., Wayzata, R. 1.
Staples, Myrtle C., West Side Sa. R. 2., St Paul.
Trieloff, Hattie L., Carver.
White, Sherman L., Excelsior.

A CLASS—108

Albers, Mary W., Northfield.
Anderson, Fred. A., Hutchinson, R. 1.
Anderson, Phillip A. W., Forest Lake.
Anderson, Sophus H., St. Anthony Park.
Ashbach, Otto B., Ada.
Baker, George J., St. Paul.
Beckstrand, Andrew C., Brookfield, R. 1
Benson, Edwin B., Jackson, R. 4.
Berg, Edgar F., Dundas.
Bilsborrow, James D., Wolverton.
Blackburn, Robert A., Royal, Neb.
Blackburn, Ralph G., Royal, Neb.
Bouman, A. W., Minneapolis.
Braxtan, Robert S., Paoli, Ind.
Bredvold, Jacob S., Belview.
Briggs, George McS., Rock Springs, N. D.
Briggs, Mary C., St. Anthony Park.
Brownell, Max C., Minneapolis.
Busse, Rose, Merriam Park, R. 8.
Carlson, Mabel H., Minneapolis.
Chase, Vere E., Minneapolis.
Comnick, Bertha J., Westbrook.
Corser, John, Minneapolis.
Crippen, Lee A., Langdon.
Dubbels, Joe P., Viola.
Dvorachek, Henry E., Glencoe.
Ehlers, L. Fred., Marshall.
Ferraby, Ethel S., Minneapolis.
Forbes, Charley S., West Side Sta., St. Paul.
Forsman, John A., Duluth.
Frentz, Frederic H., Waseca.
Gammon, Lee M., Wayzata, R. 3.
Gardner, Harriet R., Ortonville, R. 3.
Gilbertson, Henry W., Jasper.
Hallan, Henry A., Spring Grove.
Hamilton, Vida L., Osseo, R. 1.
Hancock, Morris W., Mankato.
Hardisty, Frank J., Minneapolis.

Helgemoe, Julia E., Canby.
Hillman, Frank M., Minneapolis.
Hoffman, Ernest D., Marshall.
Hofmann, Julius V., Janesville.
Holmberg, Mabel O., Center City.
Holt, Harry G., Delhi.
Jacobson, Henry, Marshall.
Jaquith, Harold H., Hopkins, R. 3.
Johnson, Clara V., Star Prairie, R. 1, Wis.
Johnson, Ernestine M., St. Paul.
Johnson, Stella A., Cannon Falls, R. 3.
Kelley, Lloyd S., Markville.
Knuteson, Einar George H., St. Cloud.
Krefting, Carl L., Minneapolis.
Lamb, Harvey H., Mazeppa.
Lambert, Lenore M., Withrow.
Larson, Sallie Marie, North Branch.
LaRue, Mary E., St. Paul.
Lawrence, Frank E., Litchfield, R. 4.
Lemke, William A., Albert Lea, R. 4.
Lenz, Valentine L., Albert Lea.
Lindall, Oscar R., Parker's Prairie.
Ludlow, Herbert D., Worthington.
McNelly, Mary E., Caledonia.
Mallery, Ema, Lakeville.
Manning Nydia A., St. Paul.
Matthews, Charles A., Ortonville.
Meck, Ethel B., St. Paul.
Minton, Harry S., Francis, Sask., Can.
Moore, Fred F., Stewart.
Morrison, Earl B., Fergus Falls.
Nelson, Arthur O., Stillwater, R. 7.
Nelson, Arthur S., Afton.
Nelson, Ellen L., Hector.
Nelson, Emil R., Canby.
Nelson, Ida O., Alexandria.
Older, Frank E., Luverne.
Ott, J. Cyrus, Albert Lea, R. 4.
Padden, Roscoe L., Stewart.
Patten, Norman B., Jr., Minneapolis.
Pederson, Inga M., Irwin, Ia.
Pemberton, Ada M., Eden Prairie.
Pengilly, Alice L., Osseo, R. 1.
Person, Fred A., Withrow, R. 21.
Peterson, Ellen W., Lafayette.
Phillips, Dinah S., LeSeur.
Pratt, Hiram E., Woodstock, Ill.
Robb, Clarence P., Winona.
Robertson, Charles J., Merriam Park, R.8.
Sargent, Clara A., Red Wing, R. 2.
Sather, Arnold A., Clear Lake, Wis.
Smith, Ralph V., Parkers' Prairie.
Southmayd, Winthrop S., Braham.
Stone, Allen W., Park Rapids.
Sullivan, Jessie, Minneapolis.
Thompson, Mark J., Winsted.
Thornton, Henry A., Appleton, R. 1.
Torgrimson, Theofred, Hanska.
Tripp, Harry P., Beardsley.
Turner, Amelia H., St. Peter.
Utter, Gustaf W., Ceylon.
Victor, Emmy M., Lindstrom.
Viets, J. J. Minneapolis.
Watson, Irene, Merriam Piark.
Wessel, Anthony A., Whte Bear.
Westmark, Arthur A. Minnetonka Mills, R. 2.
Wilcox, Richard S., White Bear Lake.
Wilson, Lillian M., Granite Falls, R. 1.
Workman, George, Villard.
Wright, A. D., St. Cloud.

B CLASS—171

Adkins, Alice E., Minneapolis.
Allen, Percy R., Winona.
Anderson, Walter R., Belgrade.
Ash, Julia A., Wendell.
Balstad, Henry O., Fosston.
Balstad, Manda C., Fosston.
Barclay, Madge, Stillwater.
Barsness, Alfred, Brandon.
Barsness, Thilda B., Glenwood.
Bartlett, Howard, Ellsworth, Wis.
Bartlett, Irving J., Mound.
Bede, Russel, Pine City.
Behnke, Gretchen, New Ulm.
Bennett, William P., Austin.
Biscoe, Julius W., St. Paul Park.
Bjorka, Knute, Fergus Falls, R. 7.
Boe, George R., Lanesburo.
Bondeson, Calextus C., Lafayette.
Brann, Alonzo S., Minneapolis.
Brown, Jessie, Merriam Park.
Budde, Theodore G., Kelloggg.
Busse, Florence A., Merriam Park R. 8.
Butterfield, James, Long Lake.
Byrne, Fred, Hart.
Cantine, Hester E., Walnut Grove.
Cantine, Sarah A., Walnut Grove.
Carlson, Elvera S., Minneapolis.
Carlsted, Alfred, Dassel, R. 5.
Carr, Elmer B., Excelsior R. 3.
Chase, Willis H., Farmington.
Cleator, Ralph A., Minneapolis.
Conaughy, Laura C., Minneapolis.

Cooper, Edgar, Adrian.
Corbett, Alice A., Minneapolis.
Cunningham, Leon C., Pipestone.
Dahlquist, Anna V., North Branch.
Dodds, Ralph F., Wheaton.
Dodds, Warren, Wheaton.
Dorn, Earl O., Brooklyn Center.
Doten, Allan L., Osseo R. 1.
Dunning, John W., Osseo, R. 6.
Durfey, Phineas D., Chatfield.
Einarson, Baldwin, Duluth.
Ellsworsh, Mildred, St. Paul.
Elsberg, Ellen, Minneapolis.
Ericson, Elmer, Hector.
Farrell, Edward, Franklin.
Feustel, Nettie C., Fairmont.
Finkbiner, David E., Royersford, Pa.
Flaten, Peter M., Granite Falls.
Fowler, Audrey M., Bethel.
Francis, Merritt, Minneapolis.
Frear, Aureline J., Minnetonka Mills.
Gaynor, Fred A., Milbank, S. D.
Gilles, Arthur P., Minneapolis.
Groger, Bruce W., St. Charles.
Hammerberg, Arvid, Shafer.
Hansen, Martin, Eyota.
Hanson, Elben, Stillwater.
Hart, Charles C., Farmington.
Hartkopf, Baldwin, Osseo.
Hauge, Effie M., Minneapolis.
Helgeson, Emma S., Sacred Hart.
Hellie, Clara, Hanley Falls.
Hellzen, Wilhelm, Clarkfield.
Hennessy Claudia S., West St. Paul.
Hewitt, Wyman H., Nassau
Hodorff, Gustave, Dixville
Hoel, Frank, Minneapolis
Holbrook, David W., Markesan, Wis.
Holman, Peter A.. Minneapolis
Howard, Raymond W., St. Paul Park
Hoyt, Corrinne, R., Fridley
Huntley, Herbert C., Hancock
Ingberg, Joseph, Hendrum
Jackson, Hjalmer M., St. Anthony Falls Sta., Minneapolis
Jackson, Joel F., Minneapolis
Joerns, Emelyn R., St. Anthouy Park
Johanson, Algott B., Wheaton
Johnson, Elida S., St. Paul W
Johnson, Ella J., Cambridge
Johnson, Mabel C., Milan
Johnson, Myrtle E., Minneapolis
Kain, Raymond, Benson
Keefe, George P., Chatfield
Kernkamp, Howard C., St. Paul
Keenholts, Raymond J., Sta F., Minneapolis
Koehler, George W., Mound
Krueger, Elsie S., Bellingham
Kueffner, Frederick J., St. Paul
Lathrop, œByron G., Hugo
Liberg, Benj. A., Haug
Lindeman, Otto., North Redwood
Locke, Elmer B., Osseo
Lundgren, Herbert P., Minneapolis
McKenney, Richard E., Minneapolis
McNee, William W., Spring Valley
Madden, William C., Waseca R 6
Manahan, Mathew, Chatfield
Mark, Levi E., Goodhue, R 5
Mason, Grafton Jr., St. Paul
Miller, Carl A., Fawndale
Miller, Charles E., St. Paul
Myrah, Olga G., Spring Grove
Neal, Winifred E., St. Paul
Newhouse, Carl O., Brandon
Noltimier, Victor B., St. Paul Park
Norcross, Everett W., Minneapolis
Norris, Bessie M., Minneapolis
Nygaard, Hartvick, Hartland
Ohland, Frederick H., Gibbon
Oliver, Chauncey R., Granada
Olson, Burke A.,. Alberta
Olson, Frederick H., Anoka
Olson, Henry A., Grove City R 4
Olson, Otto, Emmons
Ostendorf, Alford, Somerset, R 2 Wis
Ostrem, Lewis, Lanesboro R 1
Palmer, Calude E., Minneapolis
Palmer, Leone, Red Wing
Parten, Blanda R., Minneapolis
Paterson, Andrew, Wayzata
Pemberton, Joseph B., Eden Prairie
Peterson, Alget M., Camden Sta., Minneapolis
Peterson, Herbert Charles, White Bear
Peterson, Mancel, Waubay, R 3 S. D.
Peterson, Olaf O., Hanska
Pfeil, Edward F., St. Charles
Precourt, Claude W., Plover, Wis R 1
Pye, Robert B., Faribault
Qualle, Gunder, Kenyon
Randal, James H., Hinckley
Raymond, Ernest A., Summit, S. D.
Rignell, Agnes D., Winthrop
Roberts, Henry, Fergus Falls
Routhe, Oscar V., Redwood Falls R 4
Rudser, Lorentz O., Rudser, N. D.
Running, Alma C., Minneapolis
Sanders, Amy I., Houston

Sandlie, Hjalmer E., Rushford R 3
Schmidt, Paul Hugo R 1
Schramm, Lillian, Cottage Grove
Schwab, Francesca L., Bennettville
Schwantes, Anna M., New Ulm
Shaw, Bertha J., Minneapolis
Smith, Esther Louise, New Duluth
Smith, George G., Chicago
Sorenson, John A., Clinton
Spencer, Smith W., West Duluth
Stensrud, Hans G. Watson
Stephl, Otto E., LaCrosse, Wis.
Stewart, Alton R., St. Paul
Stewart, Clarence E., Forest Lake
Strong, Hazel C., Bethel
Stutzman, Harry J., Newport R 19
Theilmann, Edward C., Hancock
Theilmann, Ivy A., Excelsior
Thompson, Milton C., Franklin
Thorson, Neil, Minneapolis
Trovatten, Rollef A., Hanley Falls R.1
Van Doren, Arthur L., Farmington
Warwick, James T., Goodhue R 5
Weidt, Elsie W., Merriam Park R 8
Weium, Olaf M., Mabel
White, Clifford K., Monticello R 2
White, Glenn B., Minneapolis
Wickstrom, Hattie, Anoka R 1
Wilkins, Stanley D., Minneapolis
Wood, Harold W., Granada
Woodward, Arthur I., St. Paul Park
Young, John C., Montrose

O CLASS—368

Aamodt, Arne Wergeland, St. Paul
Aanes, Hans G., Clarkfield
Aiton, Albert Rankin, Minneapolis
Allen, Winthrop D., Wolverton
Anderson, Amil, Houston
Anderson, Arthur Lawrence, St. Paul
Anderson, Carl M., Alpha
Anderson, Louisa C., Hopkins R. 3
Anderson, Mabel J., Hills
Anderson, Reuben E., Goodhue
Anderson, Ruth L., Marine
Anderson, Serena B., Ortonville
Andreassen, Sigurd K., Minneapolis
Arhart, Henry H., Thief River Falls
Arneson, Leonard, Shelly
Arneson, Millard E., Shelly
Atwood, Warren C., Mineeapolis
Bahls, Ernest J., Round Lake
Baitinger, Alice L., Hutchinson
Baker, Ernest C., Monticello
Barnes, Leslie A., Lockhart
Bartlett, Marion G., Ellsworth, Wis.
Baukol, Marcus, Starkbuck
Bean, Wm. Elliot, Anoka
Beck, Joseph N., St. James
* Bengston, Arthur T., Hopkins
Benson, Noel C., Gibbon
Berg, Jesse F., Dundas
Bestland, John, Hanley Falls
Billings, Benjamin R., Audubon
Billingsley, H. Fay., Minneapolis
Blaylcock, Edna L., St. Paul
Blees, Marie E., Wolf Creek, Wis
Blien, Oscar A., Hanska
Boettcher, Henry C., Isanti
Bonney, Harold B., St. Louis, Mo.
Borraas, Joseph A., Dawson
Borden, Wilber D., New Brighton
Bork, Carl A., Paynesville
Bostad, Lawrence S., Fosston
Bowers, Earl W., Monticello
Bowers, Roland U., Monticello
Boyles, Edward M., St. Paul
Bradford, Frank H., Farmington
Branch, Uriah C., White Bear
Brandt, Conrad R., Morris
Brewster, James S., Brown Valley
Brewster, Nancy S., Brown Valley
Broadbent, Esther M., Cedar
Brooks, Hollis K., Lake City
Brown, Harry J., Paynesville
Brown, Jesse F., Cedar
Brown, Mabel Fannie, Hopkins
Brown, Paul C., Cresco, Ia.
Bruesehoff, Bertha M., Norwood
Bruesehoff, Rose D., Norwood
Burtness, Edwin O., Caledonia R. 1
Cadwell, Guy, Windom
Calvert, Luella A., St. Paul
Canton, Adolph G., Watson
Carlberg, Lydia, Pennock
Carlisle, Fisher A., Wyoming
Carnes, Floyd Edward, Jackson
Caswell, A. Mildred, Anoka
Caulfield, Clark E., Byron
Caulfield, Harold S., Byron
Chamberlain, Glenn W., Minneapolis
Chamberlain, Morris A., Hastings
Chapman, Lloyd E., River Falls, Wis
Chesley, Henry Geo., Beardsley
Christianson, Richard, Dawson
Clark, Gale L., Stillwater

Clark, Merritt C., South Park
Cleland, Lawrence E., Merriam Park, R 3
Clinton, Irving J., Watkins
Colberg, Benjamin J., Gladstone R. 2
Cole, Bernice M., Minneapolis
Cole, Lillian V., Minneapolis
Collins, Benjamin F., Minneapolis
Connor, Ralston I., Albert Lea
Cox, Eleanor M., St. Paul
Crandall, Austin, Medford
Cronin, Charles P., Sutton, Nebr.
Cross, David, Childs
Currie, Margaret E., Vesta
Cutler, N. Irwin, Glencoe R. 6
Dahlberg, Sella A., St. Paul
Dahley, Thomas, Hanley Falls
Dale, Manley H., Renville
Danielson, Howard H., Hendricks
Davis, Arthur W., Clear Lake
Davis, Frank L., Clear Lake
Davis, Ormel H., Walnut Grove
Delp, Lester E., Hancock, R. 3
Dernell, Adolf, Chicago, Ill
Dick, Frank C., Afton
Dittbenner, Emily M., Minneapolis
Dixon, Charlotte M., North St. Paul
Dixon, Leon M., Mora
Dobbedal, Justin L., Guthrie
Doyle, Marquis, St. Cloud
Drake, Victor E., Ruthton
Durkee, Victor I., Winnebago
Eastman, Abel F., Beardsley
Edwards, Harry D., Wauchope, Sask. Can
Edwards, Thomas H., Garvin
Eggar, Mathew C., St. Paul
Ekman, Ruth M., St. Paul
Eliason, Martin A., Artichoke Lake
Ellickson, Guy R., Madison
Enright, William J., Rose Creek
Evjen, Hilmar, Haug
Falde, Alma Judith T., West St. Paul
Falling, Albert, Dassel
Farness, Orrin, Milan
Feist, Arnold A., Gladstone R. 7
Fenlason, Roy S., Minneapolis Sta. F.R. 1
Findahl, Clara S., St. Paul
Findahl, Norman T., St. Paul
Fink, Anna M., Waconia
Fink, Rosalie H. T. Waconia
Finney, Carl, Georgetown
Flaten, Alice L., Granite Falls
Forster, Bess I., Minneapolis
Friedman, David., St. Charles, Ill.
Gardner, Heber Wm., Long Lake
Garvey, Marian L., Minneapolis
Garvey, Olive R., Minneapolis
Gilbert, Henry O., White Bear Lake
Gilbertson, Julian G., Utica, R. 1
Gill, James N., Northfield
Gillis, Ernest B., Walnut Grove
Gossman, Paul E., Canton
Grandstrand, Ruth M., Otisville
Gregson, Kenneth S., Minneapolis
Grevstad, Johanna E., St. Paul
Griffiths, Benjamin, Ottawa
Grothe, James, Hendrum
Haaland, Odin., Hendrum
Haatvedt, Edward B., Kensington
Hagestande, Thea O., Madelia
Haggard, Charles H., Worthington
Hamilton, Carrie L., Osseo, R. 2
Hamilton, Juna M., Osseo., R. 2
Hansen, Otto C., Centuria, Wis
Hanson, Arthur Melvin, Herman
Hanson, Harry M., Fergus Falls
Hanson, Wallace W., Hendricks
Harris, William M., Dundas
Harrison, Harold H., Red Wing
Hauck, Percy, Madison
Heales, Robert L., Canton
Heebink, Laura D., Baldwin, Wis.
Hendrickson, Mabel P., Mahtomedi
Henry, James A., Dover
Hermanson, Albert H., Utica
Herum, Arthur S., River Falls
Higbie, Floyd O., Eden Prairie
Hilden, Marie G., Watson
Hillman, Grover W., Minneapolis
Hodge, Helen F., Minneapolis
Holen, Julia A., Minneapolis
Hollihan, Thomas J., Litchfield
Holm, Mabel S., St. Paul
Houske, Joseph A., Halstad
Howe, Blanche, Robbindsdale
Hughes, John S., Ellsworth, Wis
Huke, Herbert, Nerstrand
Hundeby, Irving, Beardsley
Hunt, Helen L., St. Cloud
Hursh, Mertie L., Henning
Husebo, Elmer H., Madison
Ilstrup, Inez M., Minneapolis
Ingbert, Benhard, Hendrum
Iverson, Edwin I., Watson
Iverson, Henry A., Watson
Jalley, Ida M., Minneapolis
Jalley, Mary F., Minneapolis
Jirik, Thomas A., Webster
Johanson, Ruth C., St. Paul
Johnson, Emma C., Hector
Johnson, Victoria J., Hopkins, R. 3

Jones, Laurence G., Minneapolis
Jorgenson, Waldemar, Tyler
Kalmoe, Hjalmar, Montevideo
Kalstrom, Oscar J., Milan
Kanton, Emma J., Milan
Kempton, James H., San Antonio, Texas
Kendal, Eva, St. Cloud
Kendal, Guy B., Minneapolis
Kingsley, Arthur R., Stranton, N. Dak
Kinsey, Grace M., Ottawa
Kratt, John A., Morristown
Krieg, Paul N., Johnson
Krueger, Louis B., Stillwater
LaCrosse, Charles F., Audubon
Lancaster, Charles E., Wheaton
Lang, Raymond W., St. Paul
Lange, Otto H., Marietta
Larson, Edna V., Nelson
Larson, Elmer V., Nelson
Larson, Elsie S., Pennock
Larson, Grace O., Nelson
Larson, Lars J. Hendrum
Lathrop, Leslie T., Forest Lake
Leaf, Bernard P., Parkers Prairie
LeBorius, Frank, Minneapolis, Sta. F., R 3
Lemke, Henry A., St. Francis
Leonard, Bessie P., Rock Springs, N. Dak
Lilly, Elma E., Houston
Lindberg, Hattie H., Robbindsdale
Loftness, Olga E., Gibbon
Long, Lloyd D., Luverne
Lord, Herbert S., Barnsum
Lyngen, Edward, Watson
McCausland, Frank, Robbinsdale
McNary, James W., Kellog
McNeil, Earl A., Dayton
Madson, Merlin M., St. Paul
Mahlum, Howard J., Brainerd
Maltrud, Olaf L., Granite Falls
Mann, C. Howard, Excelsior, R. 1
Marget, Arthur, Isanti
Matthews, Ralph F., St. Paul
Mattimore, Arthur R., St. Paul
May, Elgie L., Wayzata, R. 1.
Mecklenburg, Edward J., Cedar
Mecklenburg, Daniel O., Cedar
Melin, Robert, Monticello
Merdink, Ray, Stephen
Messner, George W., Hancock
Meyer, Carrie F., St. Paul
Meyer, William, St. Paul
Miles, Hattie A., St. Paul
Miller, Ralph M., Robbinsdale
Mills, Elmer C., Brookfield
Moldenhauer, Ernst, Owatonna
Moline, Carl C., Excelsior, Box 87
Monson, Clifford E., Elbow Lake
Monson, Minnie, Belview
Morken, Oscar E. Bellingham
Morrill, Lee W., Granite Falls
Munger, Rai P., Ellsworth, Wis.
Munsell, Ray D., Morton
Munson, Helma A., St. Paul
Nelson, Dan M., St. Paul
Nelson, Elmer V., Nelson
Nelson, Walter O., Dwight, N. Dak.
Newhall, Webb A., Clinton Falls
Newquist, Linnea B., Minneapolis
Nodell, Mabel V., Minneapolis, Sta. F. R. 4
Nolan, Frederick E., St. Paul
Nordtomme, Anna, Watson
Novak, Frank, Effington, S. Dak.
O'Grady, May L., St. Paul
O'Reilly, Robert E., St. Paul
Olson, Agnes M., Watertown
Olson, Fred W., Maple Plain
Orton, Irvin J., Elk River
Osbloom, Marie, St. Paul
Ostenso, Helga C., Montevideo
Ostrem, Oscar U., Lanesboro
Ouren, John B., Hanska
Oyen, Emma, Watson
Patterson, Hazelle E., St. Charles, R. 1
Pearson, Carl A., Louisburg
Pederson, Wellignton E., Hopkins
Penniman, William C., St. Paul
Peterson Amy A., Otisville
Peterson, Berier, Haug
Pfeilsticker, Linn, Wabasha
Philley, Clarence G., Mazeppa
Ponthan, Harold A., St. Paul
Praught, William V., Rogers
Prince, Edward B., Minneapolis
Quist, Axel L., Cannon Falls, R. 7
Rasmusson, Albert, Pomonkey, Md.
Reeve, Pomeroy P. Tenstrike
Richardson, Forrest E., New Brighton
Richardson, Harold I., New Brighton
Ritchell, Willis, St. Anthony Sta., Minneapolis
Robertson, George L., Merriam Park, R 8
Robertson, Harry A., Merriam Park, R. 8
Rogers, Clarance E., Ellsworth, Wis.
Rodgers, Vincent B., Nashwauk
Rorrison, Lawrence P., Minneapolis
Rosander, Thomasine, Minneapolis
Ruedlinger, Louise S., Minneapolis
Samuelson, Ruth V., Lafayette
Sandager, Kristian, Tyler
Sandager, Nels S., Tyler

Sanvik, Andrew T., Starbuck
Satchell, Ethel C., Minneapolis
Sawhill, Donald, Nimrod, Mont.
Schanche, Clara E., Star Prairie, Wis. R. 1
Schillinger, Emma M. Sta. F., R. 2, Minneapolis
Schmidt, Herbert, West Concord
Schuette, Daniel C., Waseca, R 3
Searles, Dewitt M., New Brighton
Searles, Monna B., New Brighton
Seekins, Clinton B., St. Paul
Seithun, Ennis A., Rolette, N. D.
Sewal Dorothy D., St. Anthony Park
Shelp, Mabel F., Litchfield
Siemer, Edward C., Moose Lake
Sillerud, Martin, Greenbush
Silsbee, Leila, Chatfield
Simon, Peter, Altura
Sindt, Albert H., Rock Rapids, Iowa
Skow, Morris, Springfield
Skrukrud, Gust B., Fountain
Sletta, Ida O., Madelia
Smith, Bertram A., Osseo
Smith, Clara May, Ortonville
Smith, David E., Ortonville, R. 3
Smith, Frank, St. Cloud
Smith, Ida F., Robbinsdale, R. 3
Smith, John F., San Antonio, Texas
Smith, Randolph H., Minneapolis
Snell, Ruth E., Merriam Park
Solberg, Elmer C., Spring Grove
Sorlien, Oscar O., Bode, Iowa
Spencer, Hamilton, H., Henderson
Spencer, Henry J., Minneapolis
Steffens, Bonnie R., Racine
Stensrud, Edward, Watson
Stensrud, Louise L., Watson
Stensrud, Martin, Watson
Stoddard, Mildred, St. Paul
Stoltenberg, Frank, Elk River
Sundberg, Daniel, Foreston
Swedberg, Joseph L., White Bear
Sybilrud, Ella O., New Richland
Sybilrud, Nora M., New Richland
Tangen, Olena A., Hazel Run
Thompson, Charles L., Wayzata
Thompson, Thomas B., Hendrum
Thorwick, Arthur J., Thief River Falls, R. 2
Tolaas, Gudrun Marian, St. Paul
Torkelson, Carl A., St. James
Tulin, Nels O., Hardwick
Turnham, Alice, Long Lake
Turnquist, F. Arthur, Cleron, N. Y.
Ulrich, John, Wabasha
Underdahl, John A., Nerstrand, R. 2.
Veitch, Leora M., Rush City
Villars, Wendel D., Minneapolis
Voak, Jay P. Worthington
Waterman, John F., Minneapolis
Waters, Henry B., Forest Lake
Waters, Luella E., Forest Lake
Weidy, Bertha M., Marietta
White, Leslie A., Minneapolis
Whiting, Laura M., Sta. F., R. 2 Minneapolis
Wilkinson, Ora J., Minneapolis
Willford John C., Garvin
Williams, Floyed J., Sta. F. R. 4, Minneapols
Wilsion, Bessie M., Ihlen
Wilson, Selmer O., Clarkfield
Winter, Harry A., Lowel, Mass.
Winters, Laurence M., Mazeppa
Wood, Edgar R., Warren
Woodbury, Dora L., Minneapolis
Woodfill, Charles H., Litchfield, R. 1
Wright, Dean A., Austin
Youngren, Ruth A., Minneapolis
Zimmerman, Robert, Browton
Zwick, Harry R., Lake City.
* Died Oct. 29th, 1908

TEACHER'S SUMMER SCHOOL—90

Alexander, Wm. A., Morristown
Aylesworth, Vivian, Litchfield, R. 8,
Baldwin, Mary E., Pipestone
Bebermeyer, H. J., Redwood Falls
Bigelow, Mary, 4323 Dupont Av. S., Minneapolis
Bigelow, Mrs. Mary L., 4323 Dupont Av. S., Minneapolis
Bodin, George, Young America, Minn.
Boer, Ellen M., Coleraine
Booth, Hattie F., Grand Rapids
Borchardt, Ottilie, Madison
Brodt, Lillie, 819 Reane St., St. Paul
Burgess, Edith, Allen, Neb.
Bush, Ethel, 1119 6th St., S. E., Minneapolis
Butler, P. J., Chaska
Carlson, Oscar, Preston
Carter, Mrs. Sine, Drayton, N. D.
Cedergren, Edwin A., Lindstrom
Crowe, Edward J., Dresbach
Cummings, Emogene, White Bear Lake

Cunningham, Eugenia, Pipestone
Cunningham, Mabel, Pipestone
Edwards, Lucile, Little Falls
Elmer, Margaret, Chatfield
Erickson, Ellen, Alexandria
Erickson, T. A., Aleandria
Falney, Nellie, 311 13th St., St. Paul
Farrell, Margaret, Franklin
Faunce, C. S., 1100 15th Av. S. E., Minneapolis
Finnegan, Wm., Thief River Falls
Freeman, C. J., Herman
Granger, E. M., Breckendrige
Hall, Grace, Morris
Hargrave, A. W., Cokato
Hargrave, Mrs. A. W., Cokato
Harrington, Frank, Hutchinson
Hogel, Newton H., Cambridge
Higbie, E. C., Canby
Holzinger, J. M., Winona
Hoover, Harriet, Duluth
Hov, I. S., Bagley, Minn.
Howell, Mrs. D. B., St. Anthony Park
Howell, Sarah, Dawson, Wis.
James, Mrs. Mary B., Minneapolis
Johnson, Ella A., Hancock
Kent, A. R., Lanesboro
Kerkamp, Clara, Newport
King, Katherine A., Duluth
Kittleson, Arthur, Montevideo
Knebel, Celia, Pequot
Kranz, Daisy M., 3821 Stevens Av., Minneapolis
Kranz, Kate M., 3821 Stevens Av., Minneapolis
Krayenbuhl, Emilie, Excelsior
Krueger, Mary E., Bellingham
Le Gro, Emma, Bertha
Le Gro, Fannie, Bertha
Lewis, J. H., Fairbault
Lipp, Mrs. C. C., St. Anthony Park
Lommen, Georgine, Caledonia
Lord, Eva, Ghent
McAulty, H. T., Red Lake Falls
McCormick, Mrs. Harriet, Grand Rapids,
Martin, Florence, Rochester
Mithun, L. M., Warren
Nelson, Arthur, Ivanhoe
Neville, Clara, Eyota
Olson, Hermina, Lonsdale
Peake, Laura, Eagle Bend
Pickard, A. E., Hinckley
Plough, Betty, Rice
Pulver, Anna D., Canton
Richard, Belle, St. Cloud
Roberts, R. S., Morris
Robinson, Katherine, Rochester
Roddis, Bertha F., Long Prairie
Schlutz, Dorothy, M., New Richland
Sherwood, Grace, Austin
Siemer, Minnie, Moose Lake
Smith, Sarah A., New Duluth
Swanson, E. N., Stillwater, R. 7
Swenson, Alma, Maynard
Thorson, M. A., Winthrop
Tidd, John N., Meadowlands
Toevs, Frank J., Mountain Lake
Trask, Mrs. A. M., Herman
Waldron, Ruth, Rochester
Walkup, Jessie E., Pipestone
Webb, Florence B., Dawson
White, Hope, Winnebago
Wilcox, Myrtle E.,, Hancock
Wilson, Mrs. A. D., St. Anthony Park

SUMMER FORESTRY SCHOOL—18

Baker, Norman M., Davenport, Ia.
Beebe, W. L., Jr., St. Cloud.
Berry, James B., St. Paul.
Blades, W. F., Dubuque, Ia.
Bohn, George J., St. Anthony Park.
Canavarro, Deorge DeS., Honolulu, Ha.
Cochrane, H. H., Minneapolis.
Collin, William H., Northwood, Ia.
Dummer, R. C., New Ulm.
Foss, Elizabeth H., Minneapolis.
Garland, N. R., Minneapolis.
Hamilton, Carl L., Minneapolis.
Mears, Louise, Peru, Neb.
Merrill, F. B., Stillwater.
Schwedes, Carl, Wabasha.
Wanberg, Richard, Benson.
Wilson, Leila, Gridley, Ill.
Witbeck, Fanny, Colorado Springs, Colo.

FARMER'S SHORT COURSE—169

Aamodt, Carl, St.tPaul.
Abrahamson, H. B., Dassel.
Akins, Arthur T., Mayer.
Amundson, Ole, Hanska.
Anderson, Anton, West Concord.
Anderson, Awley, Hallock.

Anderson, Carl, Oberon, N. D.
Anderson, D. O., Meadowlands.
Anderson, Fred C., Glyndon.
Anderson, Oscar C., Hendricks.
Asquith, Ralph, Windom.
Aubrecht, Joseph, Beroun.
Axness, Melvin, Pelican, Rapids.
Bang, Andrew, Madison.
Benjamin, Camille, Faribault.
Bennett, Norval, Anoka Route No. 1.
Bieder, J. T., Belle Plaine.
Bjorgum, Martin, Jackson.
Blanksma, D. W., Dodge Center.
Bolland, Dick Henning R. 2.
Boraas, Albert, Hallock .
Bosin, Bruno, Mankato.
Bradley, Walter, Anoka.
Brandon, J. O., Kensington.
Brant, August, Woodstock.
Brazell, Curinne, Minneapolis.
Brazell, C. A., Minneapolis.
Bredemeier, William, Barnesville.
Broms, Henning, Excelsiror.
Burke, J. W., Deephaven.
Burtness, Peter, Cook.
Burtman, Roy, Pipestone.
Cameron, Douglas, Hallock.
Chalupnik, J. J., Beroun.
Champion, Mrs. Dagmar, Braham.
Chapman, Carl S., Westbrook.
Cheney, Eugene, Northfield.
Cheney, Jesse L., Northfield.
Conrad, John, Luverne.
Craven, John, Faribault.
Crawford, George L., St. Paul.
Dahleen, Arthur A., Maynard.
Dime, O. E., Grove City.
Dupuis, Ralph, New Richmond, Wis.
Ekegron, Oscar, Otisville.
Erickson, Arthur, Cambridge.
Erickson, C. R., Hagar, Wis.
Forfang, Egill, Hallock.
Franz, Jacob, M., Mountain Lake.
Flynn, D. H., Beardsley.
Frederick, Paul, Ottertail.
Frederickson, C. A., Hanska.
Frederickson, Clarence, Hanska.
Gackstetter, Harry W., Iner Grove.
Gasink, William, St. James.
Gran, Walter, Spring Grove.
Grant, A. D., Redvers, Sask, Can.
Gulbrandson, R. M., Albert Lea.
Haatvedt, Ole M., Kensington, R. 2.
Halvorson, Syverind, Hancock.
Handke, J. B., Waltham.
Hansen, Albert W., Baldwin, Wis.
Hanson, Jens L., Raymond, R. 5.
Hanson, Walter, Hallock.
Hector, Emery, Worthington.
Hegseth, Nels, Fergus Falls, R. 6.
Hertel, A. G., Braham.
Hilden, Herman, Watson.
Hilgers, John P., Barnesvilee.
Hohenstein, Albert, Loretto.
Holen.Melvin, Parkers Prairie.
Howard, John, Hammond.
Hunt, F. K., St. Cloud.
Iverson, Eddie, Watson.
Jensen, Alfred, Nelson.
Johnson, Carl, Pelican Rapids.
Johnson, John C., Langford, S. D.
Johnson, C. S., Albert Lea.
Jorstad, Melvin, Kenyon.
Kaeder, Leo, North St. Paul.
Kalmoe, George, Montevideo, R. 6.
Kelly, Michael Jr., Garfield.
Kepler, R. J. Jr., Nisswa.
Kepler, Mrs. R. J., Nisswa.
Knutson, Albert, Pelican Rapids.
Knutson, Ed., Adams.
Koehnen, Lawrence, Cologne.
Kunkel, Reinholdt, Rapidan.
Kurtz, Louis, Milwaukee, Wis.
Larson, Harry W., Murdock.
Larson, Swend, Rothsay.
Lawrence, O. A., Minneapolis.
Leach, William, Bird Island.
Lees, John D., Benton.
Lermon, Guy Starbuck.
Lien, Allie, Garvin.
Lindberg, Nelbert, Deer Park, Wis.
Lynn, Frank, Grand Rapids,
McCall, Thomas, Mankato.
Malcolm, Wm Jr., Bigelow.
Marien, Frank, Highwood.
Martinson, Lawes, Correll.
Mergen, Henry E., Hutchinson.
Mickelson, Martin, Groningen.
Miller, Freeman, Lakeville.
Miller, R. F., Olivia.
Moen, Anton, Esmond.
Monson, Sture, Dassel
Moran, Catherine, Farmington.
Moran, William, Farmington.
More, Clarence, Elmore.
More, George H., Elmore.
Morrison, F. G., Otisville.
Morton, C. H., St. Louis Park.
Munson, Edward, Pelican Rapids.
Munson, Martin, Pelican Rapids.

Murphy, William, Lakefield.
Nelson, Carl J., Nelson.
Nelson, Edwin, Garvin.
Nelson, Hans, St. Anthony Falls, Sta., Minneapolis.
Nelson, Oscar E., Lakeland.
Nissen, Carl, Lake Wilson.
Nystrom, Axel, Foreston.
Oberg, Ole, Hanley Falls.
O'Dwyer, Robert M., St. Cloud.
Ogren, John Langford, S. D.
Orban, William, Silver Lake.
Ostenso, Olaf, Motevideo.
Peterson, Albert, Sleepy Eye.
Peterson, Arthur, Cambridge.
Peterson, Charles Effie.
Peterson, Otto, Lake Benton..
Peterson, Peter, Isanti.
Pfeil, George, Worthington.
Pridal, Joseph, Taunton
Quevli, Antony, Lakefield.
Roach, C. E., Minneapolis.
Roppnen, Matt, Embarrass.
Ryden, Carl, J., Kennedy.
Saue, Hans O., Montevideo.
Saue, Peter P. Jr., Montevideo.
Schneider, John Walter, White Bear Lake.
Schooley, Clayton, Minneapolis.
Severtson, Severt, Hills.
Sharkey, William, J., Belle Plaine.
Shearer, Clarence, Osseo.
Skarphol, John, Madelia.
Skinness, O. M., Kenyon.
Stennes, Alfred, Halsted.
Svendsen, Hans C., Tyler.
Swanson, Adolph, Litchfield.
Swenson, Victor T., Otisville.
Threde, Harry, Lake Park, Ia.
Tisdell, Thomas, Olivia.
Toelle, Andrew, Browne Valley.
Untiedt, Albert, Lake Park.
Vollum, Martin, Hayward.
Voss, A. R., St. James.
Webb, Charles P., Medford.
Webster, Paul, Minneapolis.
Westermo, Alfred, Kenyon.
Westlie, Carl, Beaver Creek.
Whitcomb, Noyes H., Monticello.
Wicklund, Lawrence, Atwater.
Wigdahl, Gabriel, Rothsay.
Williams, Charles G., Minneapolis.
Wilson, Frank, Gridley.
Wright, Dean A., Austin.
Zimmerman, Robert, Brownton,

DAIRY SCHOOL STUDENTS—107

Abbe, Herman F., Meriden.
Anderson, Par O., Garvin.
Anderson, Peter Lewis, St. Hilaire
Bakken, John H., Scarrville, Ia.
Bartelt, Frank H., Royalton, R. 4.
Beberstein, Hugo, West Concord.
Belknap, George A., Isanti.
Benson, Charlie, Clear Lake.
Berthney, Edward, La Crosse, Wis
Borgmann, V. W., Mayer.
Borgmann, Victor, Mayer.
Brestad, Lars G., Appleton.
Brookins, Harry L., Cokato, R. 3.
Bullis, V. L., Washburn, Wis.
Call, Anton E., St. James, R. 4.
Camp, Alfred, Ellendale.
Carswell, Robert A., Clear Lake, Wis.
Cassidy, Charles M., Springfield.
Chalupnik, James J., Beroun.
Chancellor, Floyd, Delano.
Clarke, Frederick B., Fergus Falls
Dahlgren, Theodore, Freedham.
Dahlvig, Gustav A., Atwater.
Denison, Earl, Hutchinson.
Derosier, F., Terrebonne.
Donney, W. H., Glencoe, R. 3.
Elfstrom, Henry W,. Lindstrom.
Elseth, H., West Valley.
Findell, Eric A., Cambridge. R. 5.
Fish, Lee, St. Peter.
Flom, Anthony, Flom.
Gonen, Frank, Cologne.
Greethurst, Thomas M., Lewiston.
Grundeen, B. F., Murdock.
Gunderson, Marcus J., Royalton R. 4.
Hanson, E., Edgerton, Wis.
Hanson, Hans L., Albert Lea.
Harth, Frank, Minneapolis.
Hedlund, N. J., Annandale, R. 2.
Herbison, R. H., Fargo, N. D.
Hogoot, Clarence, Berlin,.
Hudovernik, Frank, Rice, R. 2.
Huro, John W., Annandale.
Ipsen, August, New Holstein, Wis.
Jacobs, L. M., Cold Springs.
Johnson, Carl A., Beresford, S. D.
Johnson, Eval L., Clarissa.
Jones, Allen W., Garvin.
Kane, James, Minneapolis.
Knutson, John A., Rapidan

Kollmann, Peter, Buckman.
Kreinbring, Louis E., Stockton.
Krogstad, Oscar J., Eau Claire, Wis.
Kuist, Gordon F., Odessa.
Laabs, W. C., New Auburne.
La Chance, Peter, Huot.
Lhotka, Victor, Silver Lake.
Lindberg, Christ, Beltrami.
Lougren, Oscar, Richardson, Wis.
Ludke, Rinhold, Sebeka.
Lund, Otto, J., Lake Mills, Ia.
Matti, Louis, Mantorville.
Meyer, John K., Webster.
Miller, Edward E., Kasson.
Miller, J. C., Augusta, Wis.
Nelson, Henry K., Lake Mills. Ia.
Nereson, Albert, Gary.
Nielson, Martin A., Shafer.
Norskog, Theodore, Portland, N. D.
Nyflot,, Ole O., Jr., Newfolden.
Paulson, Henry Clarissa.
Peterson, Erick, Long Prairie.
Peterson, Henry W., Clarke Grove.
Pier, Roy D., New York Mills.
Place, Leonard, Ellsworth, Wis.
Poppler, John Jr., Chaska.
Precht, Fred, St. Claire.
Regnstrand, W., McIntosh.
Robinson, Percy, Houston.
Roed, Jorgen, Fertile.
Rohe, Fred M., Osseo.
Rosemeisl W., Rosco.
Rouse, Fred, Lewiston.
Rude, Alfred, Gary.
Schroeder, Henry C., Lester Prairie.
Schuster, Louis, Owatonna.
Scott, John E., Dover.
Seibel, John A., Bowbells, N. D.
Shoquist, George W., Withrow.
Skoglund, Martin, Eagle Bend.
Solheid, John A., Belle Plaine.
Sederberg, E. M., Cannon Falls.
Sorenson, Einer, Kandiyohi.
Spjut, Herman, Strathcona.
Stadheim, John O., Austin.
Stomsvik, Ole, Badger.
Swinghamer, A. W., Albany.
Schwinghammer, John, Springfield.
Taftner, John L., Gary.
Thorsell, Berger, Argyle.
Thoen, Christian C., Wannaska.
Wallin, Walter E., Atwater.
Weist, Fred. L., Dakota.
Winnberg, Ola A., Leon.
Wilson, Henry, Spring Grove.
Witte, Henry W., St. Cloud.
Woodfill, Elmer J., Owatonna.

The College of Law

FOR THE DEGREE OF DOCTOR OF CIVIL LAW 5

Bates, William Earl, LL.M., Minneapolis
Denegre, James D., LL.M., St. Paul
Hermann, Arthur L., LL.M., Minneapolis
Mercer, Hugh Victor, LL.M., Minneapolis
Willis, Hugh E., LL.M., Minneapolis

FOR THE DEGREE OF MASTER OF LAW 29

Allison, Lawrence R., LL.B., Minneapolis
Brill, Harry H., Minneapolis.
Brown, Marcus Edward, LL.B St. Paul
Buell, Mrs. Irene C., LL.B. St. Paul
Crawhall, Lester Milliam, LL.B Minneapolis.
DeVaney, John P., LL.B Minneapolis.
Davies, Otto N., LL.B., Minneapolis.
Dolan, John A., Minneapolis
Doran, James E., LL.B., St. Paul.
Eenkema, Abelius, LL.B. Minneapolis
Evans, Eliza P., LL.B., Minneapolis.
Foster, Willie Kerr, LL.B Minneapolis
Groat, Benjamin Feland, LL.B., Minneapolis.
Hewitt, Harry R., LL.B., Minneapolis.
Houck, Stanley B., LL.B., Minneapolis.
Kennedy, John C., LL.B., Minneapolis
Luxton, Harry A., LL.B., Minneapolis.
Machatanz, Karl A., LL.B., St. Anthony Park
Roberts, Horace W., LL.B. Minneapolis
Sigerfoos, Edward, LL.B., Minneapolis
Swinland, John, LL.B., St. Paul
Swinland, Ingman, LL.B. St. Paul.
Schwartz, Louis L., LL.B., Minneapolis.
Simmons, William R., LL.B. Minneapolis.
Smiley, William C., LL.B. St. Paul.
Smiley, Henry LaFevre, LL.B., St. Paul.
Swee, John A., LL.B., Minneapolis.
Teisberg, Alfred., LL.B., St. Paul.
Vernon, A. H., LL.B., St. Paul.

Senior Day—55

Anderson, Arthur Harragut Minneapolis
Bartlett, James. Minneapolis.
Bingham, Charles B., Sleepy Eye.
Boyle, Edward Lewis, Duluth.
Bremer, Paul Grover, St. Paul.
Brin, John Leonard, Stewartville.
Brown, Montreville J. (A. B. U. of M.). Minneapolis.
Donohue, Keron Daniels, Minneapolis.
Duff, Hartman Blaine., Superior, Wis.
Duffy, Thomas E. J., Minneapolis.
Erickson, Harold, Hancock.
Flachsenhar, Walter Roscoe, Mankato.
Forbes, Vernon Alex., St. Croix Falls, Wis.
Forbes, Mason Merrill (A. B U. of M.) Minneapolis.
Logan, Carlton, Pelican Rapids.
McCoy, Charles Vaughan, Duluth.
McMillian, Malcolm Dana, St. Paul.
McNally, Walter Harry, Cedar Falls, Ia.
Maloy, Charles Edward Hill, St. Cloud.
Muir, Robert W. (3 yrs. U. of M.) Hunter, N. Dakota.
Murphy, Eugene Horton, Minneapolis.
O'Brien, Giles Patrick, Brainerd.
Peterson, Adolph C. (A. B. U. of M.) Minneapolis.
Prigge, Lambert F. Ada.
Rasmussen, William J., (1 yr. U. of Wis.) Phillips, Wis.
Reitz, Alfred E., Chaska.
Regan, John H., Chippewa Falls, Wis.
Garberg, Peder, Mariat
Hanson, Thorwald, (A. B. U. of M.) Benson.
Houck, Norman Albert (1 yr. U. of M.) Minneapolis.
Huber, Earl Eldon, Ellsworth, Wis.
Hudson, Irving M. Benson.
Kelehan, James H. L., Granite Falls.
Kohn, Louis, Minneapolis.
La Palme, Camille, Minneapolis.
Lauderdale, Henry Williams (2 yrs. U. of M.) Minneapolis.
Leak, John Roy, Brainerd.
Little, George Rudd (A. B. U. of M Kasson.
Linn, C. August. Fegrus Falls.
Senn, Fred William, Kasson.
Spicer, Fred Hopper, Minneapolis.
Spooner, Paul Lord (A. B. U. of M.) Morris.
Stearns, Harry I. St. Paul.
Stern, Sam. Fargo, N. Dak.
Strand, Oscar Bernard, Zumbrota.
Taylor, Wilfred Brunson, Litchfield.
Walker, Arthur J. Minneapolis.
Walker, Charles John, Spencer Brook.
Watts, William A. Crookston.
Webster, Clarence Bernhardt, St. Peter
Wendtlandt, Edward W., Manchester, Wis,
Wheeler, George Charles, Kekoskee, Wis.
Williamson, Roy F., Oronoco
Wilmsen, Harry Robert, Hecla, S. Dak.
Wooley, Mark. J. Howard Lake.

Middle Day—89

Berge, Henry S., (2 years Carleton), Minneapolis.
Berry, Howard Morgan, Mapleton.
Blanding, Howard D., St. Croix Falls, Wis.
Bonner, John Farrington, Winona.
Brazell, Edward Joseph, Minneapolis.
Bringleson, August E., Dassel.
Brown, Harry Lee, Alexandria, S. Dak.
Burdick, Ralph E., International Falls.
Campbell, Heil Stillman, Mantorville.
Canterbury, James Ralph, Minneapolis.
Christofferson, Lewis Christian, Pewaukee, Wis.
Carleton, H. G., Minneapolis.
Chase, John Armstrong, Farmington.
Colgrove, Chester Walker, Minneapolis.
Comer, Cloyde E., Round Lake.
Dahl, Theodore R. (B. S. St. Olaf) Minneapolis.
Dahl, Sigvert S., Virginia.
Doud, Fred L. (1 yr. Carleton), Chatfield.
Elwell, Edwin S., Minneapolis.
Eickhorn, Edmund P Minneapolis.
Finkelburg, Karl Augustus, Winona.
Fligelman, Sol, Minneapolis.
Flynn, Timothy George, Minneapolis
Gardner, John William, Jr., Ortonville.
Green, Raymond J., Austenburg, Oh.
Hanrahan, Morgan John (A. B. Creighton), Clare, Ia.
Ganssle, George E., Minneapolis.
George, James McBride., Renville.
Glaser, John, Appleton, Wis.
Granbeck, Joseph., St. Paul.
Grant, Malcolm E.,ault Farib.
Haas, Charles Theodore (A.B. St. Thomas), St. Paul
Haller, Adolph Ignatius, Red Wing.

Hamilton, John A. J. (2 yrs. U. of M.) Minneapolis.
Hallet, Otis Albert, Minneapolis.
Harris, George D., (1 yr. Ames) Cedar Falls, Ia.
Held, Julius W., St. Louis Park.
Helgerson, Lynn S., Plainview.
Holen, Oscar M. (1 yr. U. of M.) Argyle.
Howes, William A., Tomah, Wis.
Hughes, Raymond Mark., Aitkin.
Irwin, Harry A., Belle Plain.
Jeppeson, Frederick J., Hopkins.
Kelehan, William, Granite Falls.
Kendall, John Catlin, Minneapolis.
Kjomme, Hans O. (A. B. Luther College) Decorah, Ia.
Lampert, Jacob, Minneapolis.
Lindberg, Carl A., Appleton.
Larkin, Jay A., (A. B. Redfield) Alden.
McCanna, Simon M., Minneapolis.
McGovern, John, Arlington.
McGrath, Thomas J., St. Paul.
McMahon, John Francis, Huron, S. Dak.
Martin, John F., Minneapolis.
Murray, Frank James, London.
Miller, Harvey J., Buffalo, N. Dak.
Miller, Herschel Frederick, Minneapolis
Mohl, Everett, Adrian.
Molstad, Alfred G. (1 yr. U. of M), Clarkfield.
Moore, Earl M., Minneapolis.
Morgan, Hiram., Lake City.
Nelson, Clarence O., Granite Falls.
Nichols, Chester., Appleton.
Ostensoe, Oliver Julian, Canby.
Owen, D. Cavour, Osseo.
Pettijohn, Lyle. (1 yr. U. of M.) St. Paul.
Phinney, Brinton Harry, Herman.
Priebe, John Gustav., Minneapolis.
Quayle, Harley Mansfield, Rush City.
Radermacher, Walter Henry, Minneapolis
Randall, Frank E., (2 yrs. Hamline,) Hamline.
Schlehr, Arthur E., Frazee.
Sevaried, Ephraim (1 yr. Luther), Kenyon.
Shaw, Wilbur D., (A. B. U. of M.) Minneapolis.
Sachs, Gustav (A. B. U. of M.), Minneapolis.
Sischo, Kenneth, St. Paul.
Skahen, Vance E. (2 yrs. L. Stanford). Minneapolis.
Smith, James Russell (A. B. U. of M.) Minneapolis.
Smith, Julian C., Aberdeen, S. Dak.
Stewart, Earle William Russell, Princeton, Wis.
Stone, Alfred Finney, (2 yrs. Carleton) Morris.
Stockland, George Alfred, Minneapolis.
Sundberg, John Edward Garfield, Kennedy.
Thoreen, Reuben, Stillwater.
Torrison, Anker Osul (A. B. Luther), Manitowac, Wis.
Warren, Earl William, St. Paul
Weiland, Walter F. (1 yr. U. of M.), Brainerd.
Wigen, Joris, Sargent.
Young, Gerald. Minneapolis.

JUNIOR DAY—203

Ackley, Edward, Chippewa Falls, Wis.
Ainsworth, C. L., Minneapolis.
Adams, Innis, Minneapolis.
Anderson, Carl Anton, (A. B. U. of M.'09), Hutchinson.
Anderson, Albert A., Hendricks.
Barnes, Walter, Minneapolis.
Begin, Zephyr Louis, Robbinsdale.
Bell, Edward Earl, Minneapolis.
Berry, Frank Chas., Minneapolis.
Bintliff, Claude Addison, Minneapolis.
Bland, John Lewis, Anoka.
Blanchett, Frederic J., (A. B. U. of M.,'09) Elk River.
Block, Arthur B., St. Paul.
Bollum, Alfred E., Red Wing.
Bradley, F. G., Paynesville.
Branyan, Leon Peary, Minneapolis.
Bromley, George Francis, (1 yr. U. of So. Dak.), Redfield.
Brown, Roy Stuart, Minneapolis.
Bulen, Leon Lester, (2 yrs. U. of M.) Minneapolis.
Bullard, John R., Waseca.
Burgess, Joseph Henry, Cresco.
Cady, Harry Charles, Minneapolis.
Campbell, John, Wabasha..
Card, Elbert R., Minneapolis.
Carlson, Charles E., (A. B. U. of M., '09), Albert Lea.
Carleton, George Alfred, (2 yrs. U. of M.), Minneapolis.

Chase, Sidney March, St. Paul.
Coan, John Robert, Minneapolis.
Cole, Loyal N., Minneapolis.
Compton, Alvin R., Webster.
Conley, Arthur, Bristol, S. D.
Cooper, William James, Minneapolis.
Crocker, Richard, Minneapolis.
Cutter, Ross, Anoka.
Cutter, Edward B., Anoka.
Cutter, Leeds Hancock, Anoka.
DeReu, Charles Louis, Marshall.
Daggett, Elliott, Minneapolis.
Danielson, Peter, Minneapolis.
Davenport, Darlington, (B. Ph. Yale), Minneapolis.
Davis, William W., Minneapolis.
Deaver, Harry Gilbert, Minneapolis.
Dennis, Lawrence E., Winslow, Ill.
Digen, Gilbert M.,(1 yr. U. of M.), Minneapolis.
Door, Lester Arthur, Mankato.
Downham, Howard, Minneapolis.
Durham, Frank H., Minneapolis.
Edwards, DeWitt Clinton, Casselton, N. D.
Ellis, Lynn, Kasson.
Elwell, Alden Worcester, Minneapolis.
Elwell, Joseph T., Jr., Minneapolis.
Erdall, Leonard, Minneapolis.
Falk, Harold Newton, Minneapolis.
Fish, Franklin S., (1 yr. U. of Wis.), Minneapolis.
Flor, Albert J. D., New Ulm.
Flynn, William Edward, Caledonia.
Fogarty, Edward Leo, Buffalo.
Foley, Daniel Francis, Barry.
Frank, Leonard, St. Paul.
Frisbie, Earl J., LeRoy.
Gibbs, Myron F., Tracy.
Gilbert, George McCall, (1 yr. Hamline), Duluth.
Ginsberg, Abe, Minneapolis.
Gonska, Walter, Duluth.
Goodman, Frank Peter, Sheldon, N. D.
Goodrich, Robert Earl, St. Paul.
Greeley, Burnham H., Mapleton.
Green, Harlow B., Minneapolis.
Grimes, Gordon, (A. B. U. of M.'09), Minneapolis.
Groettum, Richard Elbert, Minneapolis.
Haglin, Edward C., Minneapolis.
Halliday, Herbert Lewis, St. Cloud.
Halvorsen, Gustav (Augsburg Seminary), Wanonningo.
Handy, Harold B., Willmar.
Hayes, Charles Leo, St. Paul.
Harrison, Clyde J., Minneapolis.
Hedman, Victor A., St. Paul.
Heidel, Albert Weiser, Minneapolis.
Hendricks, Edwin Albert, Minneapolis.
Herman, Morris, Minneapolis.
Hessian, Maurice R., LeSeur.
Hoag, Richard Lawrence, Minneapolis.
Hobart, Walter B., (C. E. U. of M. '07), Minneapolis.
Hobbs, Edwin Arnold, Canton, Ill.
Holen, Gustav Samuels (2 yrs. U. of M.), Minneapolis.
Hull, Harold J., (A. B. U. of M. '09), Wahpeton, N. D.
Hunt, Ray Nelson, Redfield, S. D.
Huntington, William H., Paynesville.
Jenness, Mauriec V. (A. B. U. of M. '09), Willmar.
Johnson, Waldemar R., Menomonie, Wis.
Johnson, Lindahl, Hamilton, Mont.
Johnson, Frederick Edward, Bird Island.
Johnson, Buford Paul, Minneapolis.
Johnston, Edgar C., San Francisco, Cal.
Jones, Levi R., Lake Crystal.
Joyce, Thomas Jefferson, Superior, Wis.
Jumper, Paul H., Minneapolis.
Kelly, Charles F., Minneapolis.
Kingsley, Kenneth, Minneapolis.
Knox, Arthur Roy, Fulda.
Knoblauch, Frederick Beek, Minneapolis
Knutson, Robert, Albert Lea.
Kranz, Ferdinand Alaxzius, Hastings.
La Grange, Orrin D., Brown's Valley.
Larrabee, Walter F., (2 yrs. U of M.), Minneapolis.
Larrabee, Orrin H., Minneapolis.
Larson, J. Leonard, Merriam Park.
Lane, John, Minneapolis.
Leathers, Robert Earl, Minneapolis.
Lee, Theodore Lawrence, Ellendale, N. D.
Lee, Walter G., Fargo, N. D.
Lewis, Addison, Minneapolis.
Lillis, John Hugh, Davenport, Ia.
Little, John T., Jr., (1 yr. Hamline) Kasson.
Lindgren, Harold Clarence, Adrian.
Lindgren, Verner Vivian, Adrian.
Lonquist, E. W., (1 yr. U. of M.), Minneapolis.
Long, Dan, Superior, Wis.
Loomis, Paul N., Minneapolis.
McCallum, Raymond E., Langdon.
McCanna, George M., McCanna, N. D.
McCrady, Willis G., Frontier,.
McDonald, Francis T., Minneapolis.

McDonald, Millard Halpin, Minneapolis
McGregor, Donald A., Minneapolis.
McHardy, John Alexander, Minneapolis.
McKinnon, John (B. S. Ia. Wesleyan), Mt. Pleasant, Ia.
McMahon, Albert Edward, St. Cloud.
Madden, Attalus John, Fairfax.
Markham, William Hugh (1 yr. Lawrence), Independence, Wis.
Melin, Ebin Luther (U. of M. '09), Minneapolis.
Mellquist, Fredolph V. H. (3 yrs. Gustavus Adolphus), Sioux Falls, S D.
Miller, Frederick Joseph, St. Paul.
Muir, John Sherman (2 yrs. U of M.) Minneapolis.
Naeseth, John Richard, (Luther Col.) Zumbrota.
Nelson, Harold S., Owatonna.
Noonan, Howard S., Madelia.
Ochu, John, Minneapolis.
Paddock, Henry A., Oak Park.
Parker, Alonzo Eugene, Guthrie Centre, Ia.
Parker, Ralph Seth, Bloomington
Patten, Floyd J., (1 yr. Carleton), Morton.
Patterson, Joseph E., Minneapolis.
Paul, Spurgeon, Wheaton.
Pickering, Earle Thomas, Geneva.
Piper, Lee H., St. Paul.
Swanson, Benjamin, Minneapolis.
Swenson, Sidel Bernhardt, Minneapolis.
Taylor, Harold R., Chaska.
Thoen, Carl, Grove City.
Trace, R. F., (Carleton), St. Cloud.
Trogner, Walter J., (1 yr. U. of M.), Minneapolis.
Ueland, Elsa, (A.B. U. of M. '09), Minneapolis.
Utendorfer, Ray E., Gaylord.
Vandever, Albert K., Minneapolis.
Vesta, Olaf, Northfield.
Vollbrecht, Oscar Arthur, Minneapolis.
Vrooman, Frank Perry, Minneapolis.
Washburn, Abbott McConnell (A. B. Yale), Duluth.
Way, Marshall, Minneapolis.
Wendlandt, Waldemar Frank, Manchester, Wis.
Welsh, H. A., Cameron.
Werring, Arthur, Minneapolis.
White, Guy A., Monticello.
White, Jay Torpey, Waseca.
Whiting, Ami Nelson, Balaton.
Wilson, Knight Blackwood, Royalton.
Wilson, Chester S., Stillwater.
Wishard, Dwight Milton (2 yrs. Yale), Minneapolis.
Woodward, Earl Raymond, Minneapolis.
Woodward, Harold Elmer, Marshalltown, Ia.
Wright, Fred B., Jr. Minneapolis.
Yates, Clyde Raymond, Minneapolis.
Place, Bryan W., Minneapolis.
Pomeroy, C. H., Moorhead.
Porter, Herbert Merwin, Minneapolis.
Ravicz, Harry, Minneapolis.
Reineke, Christian, Norristown.
Rhoads, Luke C., Minneapolis.
Rigler, Benjamin, Minneapolis.
Robinson, Frederick Hilton, (A. B. U. of M. '09), Minneapolis.
Rudesill, Henry Amos, Minneapolis.
Sands, Mabel, Minneapolis.
Sanford, Roy LeVerne (1 yr. U. of N. D.), Minneapolis.
Schain, G. S. (2 yrs. U. of M. Eng.) Brownsville.
Schroeder, Herman William (1 yr. U. of M.), Minneapolis.
Schreyer, William Edward, Minneapolis.
Schuster, Paul, Rochester.
Schuster, Carl H., Rochester.
Searle, Ralph O., Minneapolis.
Severson, Lawrence, Forest City.
Sheldon, Edward Abbott, Minneapolis.
Sinclair, Francis Howard, Glendive.
Sjoselius, Geo. B., Duluth.
Sletwold, Albert, Elizabeth.
Smith, Joseph G., Morton.
Smith, Albert K., Minneapolis.
Spaulding, Edmund, Mapleton.
Spencer, Clement A., St. Chares.
Starkey, Joseph Harold, Maplleton.
Stevens, Lewis Cornelius, Granite Falls.
Swanjord, Ole, Balaton.
Young, Ralph D., Minneapolis.

THIRD YEAR (NIGHT)—34

Akutsu, Kenji, Tochigi, Japan.
Anderson, Albert George, Starbuck.
Ballou, Ellis L., Larrabee, Ia.
Bowen, Oscar (B. A. Cent. U. of Ia.), Minneapolis.
Broderick, George M., Minneapolis,

Broderick, Leo C., Minneapolis.
Brouillard, Thomas L., (Thomas City, Col.), Charles City, Ia.
Campbell, P. P., Mayer.
Christiansen, Christian Theodore (A. B. U. of M.), Minneapolis.
Clutter, Guy Earl (A. B. U. of M.), Anoka.
Cowles, Ray John, West Concord.
Dart, Ray H., (A. B. U. of M.), Litchfield.
Easton, Dana M., Minneapolis.
George, David Wickham, Minneapolis.
Hinshaw, Virgil G. (A. B. Penn.), Minneapolis.
Huntley, Earl W., (A. B. U. of M.), Spring Valley.
LaBelle, Dezara E., Minneapolis.
Moe, Herman (3 yrs. Ausberg) Minneapolis.
Morse, David Lawrence (3 yrs. Cornell, Belmond, Ia.
Ohman, John, Greenwood, Wis.
Persinger, Floyd T., (Ph. B. Hamline) Minneapolis.
Peterson, Albert Victor Anfield, Minneapolis.
Peterson, William Leroy, St. Cloud.
Randall, Claud David (A. B. U. of M. St. Paul.
Schwestka, Claude Burr, (Ph. B. Upper Ia), West Union, Ia.
Sinclair, John Franklin, (A. B. U. of M.), Minneapolis.
Skaug, Julius, Minneapolis.
Speeter, Harold J., St. Charles.
Stine, Harry Irwin, Minneapolis.
Stratton, Paul D., Granite Falls.
Vallbrecht, Robert (2 yrs. Col. City of N. Y.), Minneapolis.
Velikanje, Emil Borguwell, Minneapolis.
Woods, George William, St. Paul.
Youngquist, Charles A., Minneapolis.

Second Year (night)—34.

Baker, Harold Irwin, Minneapolis.
Behrens, Verner George, LeRoy.
Brearley, Charles S., (3 yrs. U of M.), Minneapolis.
Brockway, Hart Lubert, Balatos.
Broderick, John J., (3 yrs U. of M.), Minneapolis.
Cheroske, Louis Sebald, Minneapolis.
Coakley, Raymond James, Minneapolis.
Corcoran, Frank Richard, Minnepolis.
Currier, George William, Jr., St. Paul.
Deering, Harold Cleaves (A. B. U. of M.) Minneapolis.
Dexter, Arthur H., Minneapolis
Ferguson, E. S., Minneapolis.
Hetzler, Henry Benedict, Minneapolis.
Lewis, William H., Minneapolis.
Marr, Gibson Atherton, Washington, D. C.
Marsh, Fayette Elain, Stillwater.
Marwin, Paul, (1 yr. U. of ·), Minneapolis.
Oulman, Orrin M., Minneapolis.
Palmer, Charles Addison, Minneapolis.
Pearson, William Edward, Fisher.
Plankerton, Roy Earle, Minneapolis.
Quigley, James Joseph, Minneapolis.
Rausch, Harry, Minneapolis.
Rowberg, H. C. (A. B. U. of M.), Hanley Falls.
Safford, Orren E., (3 yrs. U. of M.), Minneapolis.
Schuknecht, John Robert (A. B. '08, U. M.), Minneapolis.
Simer, Jerome Kenneth, (A. B. U. of Ill.), Tolono, Ill.
Smith, Amos Delbert, Minneapolis.
Smith, J. Raymond, Minneapolis.
Streissguth, Thomas, Arlington.
Struthers, James A., Minneapolis.
Swenson, Charles A. (C. E. U. of M.), Winthrop.
Wassing, Ole M., Minneapolis.
Zoerb, Albert J., (Ph. B. U. of Wis.), Algomah, Wis.

Frst Year (night)—67

Auerbach, Abraham, Ashley, N. D.
Blythe, Mrs. Virginia B., Minneapolis.
Cady, Charles Frederick, St. Louis Park.
Cant, Harold G., (A. B. U. of M. '09), Duluth.
Connelly, John (A. B. U. of M. '09), Savage.
Critchlow, Walter E., Dallas, Ore.
Dahleen, Harry William, (A. B. U. of M. '09), Maynard.

Davids, Charles Edgar, Alexandria.
Deming, Norma, Minneapolis.
Dibble, Karl A., Minneapolis.
Ford, James Martin, Minneapolis.
Gerth, Otto Arthur, Minneapolis.
Gleason, John Joseph, (2 yrs. St. Thomas) Minneapolis.
Greene, John Joseph (3 yrs. Upper Ia), Minneapolis.
Hamblin, Fred Luther, Minneapolis.
Hansen, John Henry, Minneapolis.
Hansen, Lewis, Waseca.
Hasselberg, Arthur Wilhelm, Minneapolis.
Herrick, Henry E., (2 yrs. Carleton), Minneapolis.
Higgins, Clarence H., (2 yrs, U. of M.), Minneapolis.
Hill, Albert E., Elk River.
Hughes, Emory St John, Wells.
Jenson, Carl J., Minneapolis.
Johnston, Lisle A., St. James.
Kotz, Otto Von Bismark, Minneapolis.
Kacher, James, Aloysius, (St. Thomas), Minneapolis.
Killen, F. H., Dubuque, Ia.
Lanterman, Ernest (A. B. U. of M. '09), Manden, N. D.
Linstroth, Clarence P., Preston.
Leuthold, Walter M., (A. B. U. of M '09), St. Paul.
Lyford, Kenneth, Minneapolis.
McCune, Robert H. (A. B. U. of M. '09), Benson.
McDonald, Walter, Minneapolis.
Maland, Joseph O. (A. B. U. of M. '09), Elmore.
Matchan, Roy W., (A. B. U. of M. '09),
Newgood, William O., Minneapolis.
Oberg, Ezra Nathaniel, Minneapolis.
Peabody, Orley M., Minneapolis.
Pearson, Waldemar G., Minneapolis.
Plank, George Webster, Minneapolis.
Reed, Harry C., (A. B. U. of M. '09), Sleepy Eye.
Rehnke, Edgar B., (A. B. U. of M. '09), Kenyon.
Richardson, Walter (A. B. Yale), St, Paul.
Ringdahl, Robert (A. B. U. of M. '09), Minneapolis.
Rothschild, William Warner, St. Paul.
Saxton, Robert H., (1 yr. Dartmouth), Minneapolis.
Schall, Mrs. T. D., (A. B. U. of M.), Minneapolis.
Sheild, Rexford M., Winona.
Sivright, David C., Minneapolis.
Sleeper, Raymond Allen, (A. B. U. of M. '09), Minneapolis.
Smiley, William Yale, (A. B. U. of M. '09), Minneapolis.
Smith, Walter Herbert, (U. of M. Dental College), Minneapolis.
Smith, Wilbur, Minneapolis.
Spongberg, Ernest Albert, Minneapolis.
Strelow, Harry C., Minneapolis.
Swagler, Ralph Waldo, St, Peter.
Swenson, Edward F., Minneapolis.
Thurber, Orrin Merrill (1 yr. Hamline), Chatfield.
Torelle, Arthur M., Minneapolis.
Van Rhee, George Jacob, Milaca.
Van Valkenberg, Harry, Minneapolis.
Weeks, Frederick William, Minneapolis.
White, Dan, Elk River.
Wichkaemper, Richard (A. M. Ia U.), New Braunsfels, Texas.
Williams, Clarence Strong, Minneapolis.
Williams, Lorenzo, Minneapolis.
Wright, Charles Parsons, Minneapolis.

SPECIAL STUDENTS—98

Abel, Ernest, Butterfield.
Ashley, Lynn, River Falls, Wis.
Barker, Emil V., Atwater.
Belm, Nels C., Minneapolis.
Bielejewske, Casimer F., Minneapolis.
Bradison, George C., Minneapolis.
Bradley, Carleton E., Soldier's Home.
Brown, Hosner A., Brownsdale.
Brunsvold, Olindo M., Hannaford, N. D.
Bryant, B. Moon, Minneapolis.
Butler, John Edward, St. Paul.
Callaghan, Gerald J., Minneapolis.
Cameron, George Artymus, Minneapolis.
Cappelin, Felix Grover, Minneapolis.
Chalgren, Edward A., Sauk Rapids.
Casserly, Bernard Ambrose, Minneapolis.
Cheney, Christopher, A., Minneapolis.
Cohen, Julius, Minneapolis.
Cook, Russel Dwight, Minneapolis.
Davies, Clifford, Minneapolis.
Donaldson, Sidney E., Minneapolis.
Evans, William H., Minneapolis.
Fitchette, Elwood D., Minneapolis.
Fountain, Percival T., Hawley.

Freudenfeld, Alfred J., Minneapolis.
Fuller, Nathaniel Hayes, Minneapolis.
Garrett, Arthur T., St. Paul.
Gaus, Fred William, Minneapolis.
Gran, Arthur W., Minneapolis.
Gobbels, Victor A., Minneapolis.
Gorham, George T., Minneapolis.
Gray, Walter Baker, St. Paul.
Gullings, Tolen E., Detroit.
Gunderson, Lewis C., Poynette.
Hanson, George W., Minneapolis.
Harkee, Charles D., Minneapolis.
Hennessey, Walter H., Minneapolis.
Hjort, Carl Lyng, Minneapolis.
Hoffman, Edward, Rochester.
Holland, Henry, St. Paul.
James, George M., Minneapolis.
Johnson, Charles William, Minneapolis.
Keenan, Raymond Miles, Austin.
King, William A., Grand Rapids.
Kremer, William A., Minneapolis.
Langen, Leonard Henry, Battle Creek.
Laybourn, Charles Guy, Jr., Lake Minnetonka.
Liebenstein, Ernest A., Whittemore, Ia.
Martin, Gerald R., Minneapolis.
Martin, Paul Works, Minneapolis.
McNamara, Charles, Montello, Wis.
McAlmon, Herbert Ross, Madison, S. D.
McDowall James K., Seattle, Wash.
McDermott, Eugene Mills, Minneapolis.
Mather, Vernon T., Minneapolis.
Miller, Allan T., St. Paul.
Michlieson, Fred Russell, Minneapolis.
Mitchell, John W., Minneapolis.
Morrison, Neal, Minneapolis.
Murphy, Clement Paul, Minneapolis.
Nailen, James Clark, Minneapolis.
Nelson, Claus M., Minneapolis.
Newlin, Walter D., Minneapolis.
Ness, Carl O., Minneapolis.
Norton, John, St. Charles.
Olson, David H., Minneapolis.
Peterson, Adolph Martin, Minneapolis.
Peterson, Harold R., Minneapolis.
Proctor, George E., Minneapolis.
Poucher ,Jay Colton, Minneapolis.
Roak, Frank, Minneapolis.
Repke, Leonidas, St. Paul.
Robertson, Aleck D., Minneapolis.
Ryan, Arthur, Duluth.
Samels, John Philip, Minneapolis.
Schaeffer, Jacob P., Kenoshe, Wis
Scharf, Charles, Robbinsdale.
Scherven, Alfred William, Minneapolis
Skahen, Sorenus Paul, Princeton.
Skiles, Thomas Daggo, Minneapolis.
Skotheim, Olof H., Tacomah, Wash.
Soukup, L. F., St. Paul.
Smith, George Edward, Minneapolis.
Sorum, Gustav Edward, Minneapolis.
Stafford, Lac Frank, Minneapolis.
Strand, Oscar Carl, Minneapolis.
Spencer, L. W., Minneapolis.
Swain, Hubert A., Minneapolis.
Swenson, H. G., Rush City.
Templeton, Clarence Allen, St. Paul.
Thompson, A. R., Minneapolis.
Throbeck, Samuel Tollef, Minneapolis.
Turner, Joseph Walter, Rochester.
Wanvig, Orlando, Minneapolis.
Waters, Murray R., Minneapolis.
Wendland, Theodore, Minneapolis.
Weisel, Paul Rudolph, Minneapolis.
Vollin, Henry Richard, Minneapolis.

The College of Medicine and Surgery

GRADUATE STUDENTS---3

Hennings, A. J., Taylor, N. D. MD., Sioux City College of Medicine, '98.
Keats, Julia M., Minneapolis, Minn. M.D., Minnesota Hospital Medical College, '87.
Tilderquist, David L., Superior, Minn. M.D., University of Minnesota, '03.

GRADUATES OF 1908

Alexander, Ida Mary, Carver, Minn. A.B., University of Minnesota.
Andrews, Roy Newberry, Mankato, Minn.
Bloom, Charles Joseph, Clear Lake, Wis. A.B., '04, Carleton College.
Bock, Rolland, St. Paul. Minn. Phar. C. University of Minnesota.
Bostrom, August Edward, Minneapolis, Minn. B.S., '06, University of Minnesota.

Boyd, Leon Morelle, Alexandria, Minn.
Burns, Herbert Arthur, Hutchinson, Minn
Brown, John C., Minneapolis, Minn. A.B., '99, Leland Stanford University.
Dahleen, Henry, Granite Falls, Minn.
Engstrom, Fred Alonzo, Cannon Falls, Minn.
Esser, John, Austin, Minn.
Kusterman, George Byashe, Lewiston, Minn.
Fortier, Edward L., Little Falls, Minn.
Grangaard, Henry Oswald, Kindred, N. D. A.B., Luther College.
Hemingway, Ernest Eugene, Minneapolis, Minn. B.A., '98 Ripon, M.A., '03, University of Minnesota, Ph.D., '04, University of Minnesota.
Hensel, Charles Norton, St. Paul. Minn.
Hitchings, William Sidney, Sutherland, Iowa.
Johnston, Edward James, St. Cloud, Minn.
Lawrence, Edward John, Marshall, Minn.
Lindberg, Arvid C., Harris, Minn.
Maertz, Will Francis, New Prague, Minn.
Magnusson, Gustaf Alfred, Harris, Minn. A.B., University of New Mexico.
Manley, James Rollin, Duluth, Minn.
Nelson, Melvin Sylvanius, Dawson, Minn. B.S., '06, University of Minnesota.
Roan, Carl Martin, Minneapolis. B.A. Augsburg.
Ryan, Dennis Edward, Shakopee, Minn. A.B., St. Thomas.
Smith, Clarke S., Bozeman, Mont.
Stebbins, Eugene Benson, Barron, Wis.
Strachauer, Arthur Clarence, Minneapolis, Minn.
Walker, John Frank, St. Paul, Minn.
Walker, George Hamilton, Minneapolis, Minn. B.S., University of Nebraska.
Watson, Tolbert, Albany, Minn. B.A., Malcalester.

FOURTH YEAR---1908-09---55

Anderson, Oscar H., Star Prarie, Wis.
Baker, Ernest L., Minneapolis, Minn.
Barney, Leon A., Gettysburg, S. D. B.S., '07, University of Minnesota.
Beedle, Ethel R., Minneapolis, Minn.
Black, William, Minneapolis, Minn. A.B., '03, Wabash College.
Blakeley, Clement O., Neenah, Wis.
Blegen, Hallward M., Minneapolis, Minn. A B., '04, Augsburg College.
Boorem, Clifton A., Stillwater, Minn. B.S., '07, University of Minnesota.
Brimmer, Archie E., St. Paul, Minn. B.S., '07, University of Minnesota.
Brooks, Charles N., Minneapolis, Minn.
Buckley, John J., Portland, Ore.
Caldwell, James P., St. Paul, Minn.
Campbell, Albert A., St. Paul, Minn.
Coleman, Fred, Minneapolis, Minn. Ph.B., Hamline University.
Critchfield, Lyman R., Hunter, N. D. B.S., '07, University of Minnesota.
Delmore, John L., Marshfield, Wis. B.S., '07, University of Minnesota.
Doolittle, Leeroy E., Sioux Falls, S. D. A.B., University of Minnesota.
Drake, Charles R., Rushford, Minn.
Earl, George A., Minneapolis, Minn. A.B., University of Minnesota.
Fiksdal, Mads J., Webster, S. D.
Foshager, Henry T., Pennock, Minn. B.S., '05, St. Olaf's College.
Gardner, Ray, Mantorville, Minn. B.S., '07, University of Minnesota.
Glyer, Richard T., Superior, Wis. B.A., '07, Carroll.
Greaves, Jay, Glencoe, Minn.
Griebenow, Frederick, Alexandria, Minn. A.B., '04, University of Minnesota.
Hayes, Michael F., Lanesboro, Minn. B.S., '07, University of Minnesota.
Healy, Raymond T., Minneapolis, Minn
Iverson, Anthon B., Beldenville, Wis.
Johnson, Selmer M., New Richland, Minn
Kellogg, Paul M., Red Wing, Minn.
Kurz, John W., Alden, Minn.
Larsen, Martin, Atwater, Minn. B.S., '07 University of Minnesota.
McIntyre, Philip H., Litchfield, Minn.
Maxeiner, Stanley R., Minneapolis, Minn.
Mendelson, Oscar, Minneapolis, Minn. A.B., '05, University of Minnesota.
Meyerding, Henry W., St. Paul, Minn. B.S., '07, University of Minnesota.
Milner, Augustus F., Minneapolis, Minn.
Mortonsen, Nels G., St. Paul, Minn.
Murphy, Ignatius J., Lakefield, Minn. B.S., '07, University of Minnesota.
Olson, William P., St. Paul, Minn.
Ostergren, Edward W., Gladstone, Minn.

Oyen, Martin, Watson, Minn.
Paulsen, Edward L., Hanska, Minn. B.S., '07, University of Minnesota.
Perry, Clarence G., St. Paul, Minn. B.S., '07, University of Minnesota.
Peterson, Henry F., Chisago City, Minn. A.B., '02, Gustavus Adolphus College.
Robertson, Archibald Wright, Litchfield, Minn.
Schmidt, Henry A., Westbrook, Minn.
Stadfield, Clayton G., St. Paul, Minn.
Stewart, Miss Elsie, Minneapolis, Minn.
Sundt, Mathias, Minneapolis, Minn. A.B., '06, University of Minnesota.
Sutton, Charles S., Prior Lake, Minn. A.B., '06, University of Minnesota.
Trowbridge, E. H., Minneapolis, Minn.
Walker, James D., Moorhead, Minn. A.B. University of North Dakota.
Zander, Chas. H., Rochester, Minn. Ph.C., '02, University of Minnesota.

THIRD YEAR—40

Allen, Charles C., Jr., Ada, Minn. B.S., '07, Carleton, College.
Binger, Henry E., Tulare, S. D.
Brey, Frank, Lafayette, Minn.
Cavanor, Frank T., Minneapolis, Minn. A.B., '03, University of Illinois.
Christianson, Andrew, St. Paul, Minn.
Cole, Wallace, St. Paul, Minn.
Dickson, Thomas H., Jr., St. Paul, Minn. A.B., Malcalester.
Flynn, Robert E., Caledonia, Minn.
Hasty, Miss Ella M., Minneapolis, Minn.
Hayes, James M., Millville, Minn. B.S., '04, Carleton College.
Hoff, Alf., St. Paul, Minn. B.S., '08, University of Minnesota.
Holland, Angell S., Benson, Minn. B.S., '08, University of Minnesota.
Johnson, Carl John M., Pelican Rapids, Minn.
Julien, Albert Edward, Braham, Minn. A.B., '03, Hamline University.
Kjelland, Andrew A., Rushford, Minn.
Lysne, Henry, Northfield, Minn. B.S., '06, St. Olaf's.
McCarten, Robert E., Fargo, N. Dakota.
McEwan, Samuel W., Alexandria, Minn.
Moore, Chas. Ulysses, Staples, Minn. A.B. University of Texas.
Nordin, Charles G., St. Paul, Minn. B.S.' '08, University of Minnesota.
Ohage, Justus Jr., St. Paul, Minn.
Oppegard, Manford, Madison, Minn. B.S., '08, University of Minnesota.
Papez, James W., Hector, Minn.
Piper, Monte C., Mankato, Minn.
Preine, Irving A., Minneapolis, Minn.
Satersmoen, Theodore, Lac qui Parle, Minn
Schneider, Edwin H., St. Paul, Minn.
Schrader, Herman, F., St. Paul, Minn. A.B., '02, A.M., '03, University of Minnesota.
Seham, Max, Minneapolis, Minn.
Simons, Jalmar H., Waseca, Minn. B.S., '08, University of Minnesota.
Smith, Leon G., Benson, Minn.
Souba, Frederick J., Hopkins, Minn. B.S., '08, University of Minnesota.
Treat, Albert M., Blooming Prarie, Minn.
Tyrrell, Alfred A., Waterville, Minn.
Vigeland, Jorg G., Nielsville, Minn. B.A., St. Olaf's College.
Watson, Earl M., Crawfordsville, Ind A.B., '03, Wabash College.
Wyman, Kate, Northfield, Minn. A.B., '00, Carleton College.
Yoerg, Otto W., Winthrop, Minn.
Zimmerman, James, Vandalia, Ill. A.B., Wabash College.

SECOND YEAR—30

Anderson, Francis W., Dickinson, N. D.
*Barnard, Elizabeth, Minneapolis, Minn.
*Barron, Moses, Minneapolis, Minn.
Berkman, David Mayo, Rochester, Minn. B.S., '09, University of Minnesota.
*Craig, Russell, Souris, N. D.
*Dedolph, Karl, Minneapolis, Minn.
Emert, Harry F., Lockport, N. Y. B.S., '09, University of Minnesota.
*Fulton, Philip R., Minneapolis, Minn.
Geist, Geo Arthur, Minneapolis, Minn. B.S., '09, University of Minnesota.
Heidel, Cecil T. Sherburn, Minn.
*Hengstler, W. Howard, Wilmar, Minn.

Kelly, Paul Harold, St. Paul, Minn. Ph.C., University of Minnesota.
Kremer, Walter John, Cold Springs, Minn.
Larkin, Chandler C., Minneapolis, Minn.
*Leitch, Archibald, Minneapolis, Minn.
McLaurin, Archibald A., Midland, S. D. A.B., South Dakota.
*Madsen, Christenia A., Minneapolis, Minn.
Mitchell, Whiting B., Chehalis, Wash.
*Nicholson, Murdoch A., Wilcox, Ariz.
Olson, Chas. A. St. Paul. Minn.
Riddell, Edwin G., D.D.S., Northfield, Minn.

*Students of combined six-year medical course, B.S., M.D.

Rotnem, Thomas Peter, Madison, Minn.
Rumreich, E. A., Pisek, N. D.
Ruud, Magnus, Fosston, Minn. B.A., North Dakota.
Spear, Albert Edgar, Owatonna, Minn. Ph.B., '05, Hamline University.
Strobel, William G., Mankato, Minn. B.S., '09, University of Minnesota.
Thompson, Victor C., Preston, Minn.
*Turnacliff, Dale D., Waseca, Minn.
Warner, Ohmer Hubert, St. Paul, Minn.
Ziskin, Thomas, Chisholm, Minn.

*Students of combined six-year medical course, B.S., M.D.

FIRST YEAR—49

Amundsen, Albert E., St. Paul, Minn.
Baker, Willard R., Leavenworth, Kan. A.B., '08, Park College.
Benson, Ross D., Toledo, Ia. B.S., '07.
Bergan, Otto. Spokane, Wash. B.S., '08, St. Olaf's College.
*Berrisford, Paul D., St. Paul.
Borgman, Melville B., St. Paul, Minn.
*Bratrud, Arthur F., Warren, Minn.
Bye, Richard, Lily, S. Dakota. B.S., '08, St. Olof's College.
*Carroll, William C., St. Anthony Park, Minn.
*Dedolph, Theodore, St. Paul, Minn.
*Dorge, Richard Irving, Minneapolis, Minn
*Douglas, Jesse E., Blue Earth, Minn.
Drake, Charles B., Minneapolis, Minn. B.A., Yale,'08.
*Eisengraber, G. A., St. Paul, Minn.
Fagerstrom, Albert H., Minneapolis, Minn.
Flom, Andrew O., Minneapolis, Minn. B.S., '08, St. Olaf's College.
Freligh, Wilfred P., Stillwater, Minn.
Fries, Lyman A., Minneapolis, Minn. B.A., '07, Luther College.
*Frisch, Frank P., St. James, Minn.
Gardner, Edwin L., Minneapolis, Minn.
*Griffin, Patrick J., St. Paul, Minn.
*Handy, John A., Minneapolis, Minn. Ph.C., University of Minnesota.
Hayes, Edward W., Minneapolis, Minn.

*Students of combined six-year medical course, B.S., M.D.

Hodge, Edwin (Special), Minneapolis, Minn.
Hughes, William V., Minneapolis, Minn.
*Kirsch, Ralph, L., Minneapolis, Minn.
*Kittleson, Olaf L., Zumbrota, Minn.
*Klein, Harry, Duluth, Minn.
Lawler, Frank J., Minneapolis, Minn.
Long, Will H., Elysian, Minn.
*Michelson, Henry E., Bismarck, N, D.
*Morris, Mary, Minneapolis, Minn.
Nelson, Peter E., Elk Mound, Wis. B.S., St. Olaf's College.
*Nordley, Harry R., Minneapolis, Minn.
Nyvall, Yorgve J., B.A., Moorhead, Minn.
Passer, Adolph A., Kenyon, Minn. A.B., '02, University of Minnesota.
*Peppard, Thomas A., Minneapolis, Minn.
Phelps, Kenneth A., Fargo, N. D.
*Pollock, Lee W., Rochester, Minn.
Robb, Walter C., Minneapolis, Minn. B.A., '08, University of Minnesota.
Satterlund, Victor L., New Richmond, Wis.
*Seifert, Otto J., New Ulm, Minn.
*Snyder, George W., St. Paul, Minn.
Undine, Clyde A., Minneapolis, Minn.
*Weed, Frank E., Conway, N. D.
*Whittier, Raymond W., Minneapolis, Minn.
Wilson, Paul White, St. Paul, Minn. B.S., '06, Iowa Wesleyan University.
*Workman, Warner G., Tracy, Minn.

SPECIAL STUDENTS—3

McClintic, C. F., Anoka, Minn. B.A., Randolph Macon College. Special student taking Anatomy.
Pearsall, Phebe L., Port Byron, Ill. B.S., Beloit College. Special student taking Physiology.
Saari, John, Sparta, Minn. Law, University of Minnesota, '08. Special student taking Anatomy.

SIX YEAR MEDICAL STUDENTS

SOPHOMORES—42

Bandeaux, George I., Brainerd.
Boness, Hazel, Minneapolis.
Bratrud, Edward, Spring Valley.
Brodie, Walter D., St. Paul.
Campbell, Lowell M., Minneapolis.
Cooley, John Ford, Madelia.
Critchfield, R. J., Minneapolis.
Davis, Thayer, C., Akeley.
Finley, William F., Ferryville, Wisconsin.
Hall, Joseph M., Minneapolis.
Hening, Robert M., Minneapolis.
Hilger, Leo A., St. Paul.
Howe, Archibald W., St. Paul.
Josewitch, Alexander, Minneapolis.
Kleinmann, Francis, Hutchinson.
Kucera, William J., Hutchinson.
Langworthy, Effie W., Minneapolis.
Langworthy, Willis H., Minneapolis.
McGuire, Lee, St. Paul.
McIntosh, Harry C., St. Paul.
McMillan, Ralph, Minneapolis.
Mangan, Louis A., Crystal, N. D.
Mariette, Ernest S., Minneapolis.
Matthews, Ralph, St. Paul.
Moersch, Fred. P., St. Paul.
Morell, Clifford F., Verndale.
Nesse, Silas Arthur, Mabel.
Nordland, Martin, Minneapolis.
Nuessle, Walter, Springfield.
Quindell, Earle D., Neche, N. D.
Reum, Arthur W., Minneapolis.
Robilliard, Charles M., Faribault.
Rydell, Charles B., North Branch.
Senescall, Cleve M., Ortonville.
Sjolas, Amly, Hoffman.
Smith, Orrin Kenneth, Minneapolis.
Stratte, Joseph J., Dawson.
Strerath, Paul A., St. Paul.
Warwick, Margaret M., Goodhue.
Webb, Roscoe C., Tracy.
Wohlrabe, Arthur A., Truman.
Woltmann, Henry W., Minneapolis.

FRESHMEN—58

Aldworth, Harold M., Rochester.
Anderson, Philip, St. Paul.
Anderson, Stewart H., Wells.
Brown, Florence C., Duluth.
Brown, Harold J., Minneapolis.
Carver, Roy, Wabasha.
Coffin, Lela L., Minneapolis.
Comfort, Russell D., Stillwater.
Conley, Alva A., Cannon Falls.
Cooperman, Harold O., Minneapolis.
Dietz, Mrs. Mattie K. M., Kimball.
Duckstad, John B., Fertile.
Elston, Leo, Jr., Minneapolis.
Everlof, Leonard, Minneapolis.
Franchere, Fred W., Lake Crystal.
Ghostley, George F., Minneapolis.
Goetzenberger, Joseph J., Minneapolis.
Gummesson, Karl C., Minneapolis.
Halgren, John A., Waseca.
Hammermeister, Theodore F., Morgan.
Hansen, Harold N., Minneapolis.
Hanson, Theodore L., Alden.
Hartig, Hugo, J. A. J., Minneapolis.
Hendrickson, Gilbert, Christine, N. D.
Hermanson, Hermina, Wahpeton, N. D.
Keller, Grover J., St. Paul.
King, William, Chippewa Falls, Wis.
Kline, Stella M., Anoka.
Kvitrud, Gilbert, Minneapolis.
Larson, Wilmer L., St. Paul.
Leavenworth, Richard O., Minneapolis.
McCarthy, Frank M., Brainerd.
McCrady, Willis G., Frontier.
McKeon, Joseph O., Montgomery.
McLean, Thomas E., Devil's Lake, N. D.
Mentzer, Edward, Duluth.
Michael, Joseph C., Jordan.
Miner, Leon W., Blue Earth.
Myers, Thomas, St. Paul.
Nelson, Arthur P., Minneapolis.
Nye, Katherine, Minneapolis.
Olson, Oscar B., St. Cloud.
Preston, Paul J., Luverne.
Russell, Thomas J., Fairfax.
Schroeder, John, Minneapolis.
Simonson, Alfred W., Minneapolis.
Sohlberg, Olof I. A., St. Paul.
Stone, Harold W., Morris.
Sutter, Rose I., Minneapolis.
Van Campen, George G., Cannon Falls.
Vangsness, Ingmar C., Goodhue.
Walker, James C., Jr., Minneapolis.
Way, Marshall, Minneapolis.
Weiss, Raymond O., Minneapolis.
Wheeler, Everett A., Minneapolis.
Willius, Frederick, St. Paul.
Wold, Karl C., St. Paul.
Woodward, Floyd O., Minneapolis.

STUDENTS IN THE COLLEGE OF PHYSICIANS AND SURGEONS, MEDICAL DEPARTMENT, HAMLINE UNIVERSITY

GRADUATES OF---1907-08

Beardsley, Grant Stanley, Yucca, No. Dak.
Cawgill, Charles Hall, Redwood Falls.
Clay, Albert James, Waterville.
Colp, Donald Gray, Robinsdale.
Dezell, Earl M., Sunset, Wash.
Eichler, William C., Ada.
Froyland, T. J., Minnesota.
Gibbs, W. H. G., Selkirk, Man., Canada.
Girvin, Richard B., Mankato.
Hall, Henry H., St. Paul.
Heron, Roy C., St. Paul.
Hursh, Marion M., Henning.
Hollands, William Howard, Canada.
Jacquot, Gaston L., Stillwater.
Johnson, Einer W., Minneapolis.
Kells, Oakford A., Minnesota.
Kennedy, Edward F., Minneapolis.
Kerrick, Stanley E., Minneapolis.
Kingsley, R. J., Anaconda, Mont.
Lee, John W., Minneapolis.
Masone, Edward, Minneapolis.
Miller, Troy S., Illinois.
Moats, Virgil H., Ohio.
Nelson, Walter P., Barnesville.
Olson, Reinhart G., Nicollet.
Ostrander, Arley John, Minneapolis.
Patterson, Charles H., Barnesville.
Paulson, Theodore S., Dalton.
Schons, Edward, St. Paul.
Schmidt, George Fred, Minneapolis.
Smith, Ray Edward, Minneapolis.
Soderquist, Arthur Richard, Lafayette.
Wright, Swan G., Minneapolis.

FOURTH YEAR---21

Dickey, Robert Randolph, Minneapolis.
Evarts, Arrah B. Miss, Mantorville, Minn.
Gelz, John James, Minneapolis.
Ghostley, Fred J., Minneapolis.
Ghostly, Mary C., Minneapolis.
Gilkey, Seth E., Minneapolis.
Haverstock, Arthur David, Minneapolis.
Kaufhold, George F., St. Paul.
Lommen, Clarence Edgar, Buxton, N. D.
McCarty, Edison Orin, Minneapolis.
MacDonald, Daniel A., Wabasha.
Plankers, A. F., Minneapolis.
Rosenwald, John Paul, Madison.
Schnache, Roy Alvin, St. Paul.
Sewell, George Melville, Minneapolis.
Skemp, Frank Scofield, Minneapolis.
Thornby, Hallward J., Dawson.
Trenkle, Henry Landalynn, Minneapolis.
Vadheim, Alfred Lyman, Garriston, S. D.
Van Beboget, Lewis Minneapolis.
Westerman, F. C., Montgomery.

THIRD YEAR---17

Anderson, William Austin, Hopkins, Minn.
Beardsley, Wayne M., Minneapolis.
Borglund, Charles, Minneapolis.
Clay, Frank Homer, Minneapolis.
Dady, Elmer Eugene, Wabasha.
Floew, Arnt F., Minneapolis.
Ingerson, Carl A., St. Paul.
Johnson, George Luther, Minnesota.
Kramer, Edward R., Preston.
Love, George Robert, Preston.
Lynch, Elizabeth Aileen, Hopkins.
Martin, Seth Henstis, Alburgh, Vt.
Perkins, James Robert, Minnesota.
Petit, Leon Julien, Minneapolis.
Russell, Fred George, Minneapolis.
Weibler, Earl B., Fargo, No. Dakota
Williams, John Taylor, Minneapolis.

SECOND YEAR---35

Arnson, Julius Ord, Eau Claire, Wis.
Condit, Sannes Irving, Forest City.
Cornwall, William B., Eveleth.
Corry, Earl Harrison, Buxton, N. Dakota.
Dailey, William John, St. Paul.
Daskoski, John Lawrence, Minnesota City

Goodheart, Charles Joseph, Fargo, N. Dak.
Hanson, Adolph Melanchthon, Red Wing.
Hedenstrom, Louis Henry, St. Paul.
Holtan, Theodore, Washburn, N. Dakota.
Hynes, Edward J., Minneapolis.
Julien, Eric Alfred, Braham.
James, John Barlow, Mandan, N. Dakota.
Kelly, John Vincent, St. Paul.
Kennedy, Claude Clement, Minneapolis.
Kennedy, Roy Robert, Minneapolis.
Klint, John Alfred, Minneapolis.
Lackey, Harry Munson, Minneapolis.
Lande, Benjamin, St. Paul.
Laurent, Antoine, Minneapolis.
McCarthy, William Reginald, Minneapolis.
McDowell, John Perry, Minneapolis.
May, Clayton Eugene, Minneapolis.
Raiter, Franklin Sol, Minneapolis.
Remington, Paul Archibald, Walnut Grove
Riis, Tonnes O., Bowbells, N. D.
Rutherford, Hillmar Clifford, St. Paul.
Schumacher, Nicholas William, Minneapolis.
Shalett, Benjamin Joseph, Minneapolis.
Spurbeck, Roy George, Two Harbors.
Wilder, Curtis Warde, Minneapolis.
Wilson, Clyde Earl, St. Paul.
Wooster, Arthur Monroe, Minneapolis.
Ziegler, Edward Jerome, Frazee.

The College of Dentistry

THIRD YEAR—48

Bakke, Frederick Charles; Stephen
Basford, Clarence Meredith
Bird, Clement Keyes; West Concord
Cahill, John Francis; Waseca
Chapman, Edgar; Minneapolis
Coad, Cecil Walters; Minneapolis
Coulter, Mellville Rankin; Anoka
Crone, William Herman; Minneapolis
Cryderman, William Jacob; Devils Lake, N. D.
Davis, Oscar Detorest; Detroit
Doris, John R.; St. Paul
Ebersperger, Joseph F.; Minneapolis
Ernst, Max Emil Paul; St. Paul
Gustafson, Richard Elmer; Winthrop
Janecky, Joseph William; Hutchinson
Kohagen, John Benjamin; Duluth
Larson, Arnold John; Minneapolis
Lawrence, Edward; Winthrop
Linder, William Floyd; Minneapolis
Lippit, Dunbar Francis; Duluth
Lund, William Theodore; Dawson
McFadden, Charles Atkinson; Duluth
McPhail, Archie; Spring Valley
Metcalf, George Robert; Osakis
Michalson, Abraham; Hudson, Wis.
Mittelstaedt, Frank August; Millbank, S. D.
Moos, William H.; St. Cloud
Nesse, George Allen; Mabel
Nordin, Emil Nels; Marine Mills
O'Neil, James W.; Lake City
Pagenkopf, Alford Albert; Mapleton
Philips, Frank John; Lansing
Porter, Irving Lester; Wilmar
Quast, Louis Chris; Janesville
Rand, Henry Dane; St. Paul
Rayman, Fay Washington; Austin
Ruggles, Arthur Millette; Osakis
Salisburg, Earl; Minnewauken, N. D.
Schwartz, Charles; Minneapolis
Scribner, Marguerite Sawyer; Minneapolis
Solberg, Chris Bernard; Montevideo
Solem, Paul Oscar; Minneapolis
Swanson, Arthur Emanuel, Minneapolis
Thullen, Carl Augustus; St. James
Walker, Arthur William; Alexandria
Wiethoff, Charles; Minneapolis
Wilson, Edgar Osiander; Kasson
Winter, Seward Randall; Minneapolis

SECOND YEAR—49

Adams, Frank William; Wilmar
Allison, James Hawxhurst; Anoka
Bantle, George Anthony; St. Paul
Bellingham, Roscoe Charles; Bellingham
Braafladt, Ole Andrew; Bellview
Brekhus, Peter John; Minneapolis
Commers, Leo Phillip; Minneapolis
Dunbar, Francis Warren; Minneapolis
Dvorak, Joseph William; Renville
Eckman, Phillip; Granite Falls
Goldbum, Hal Sol; Minneapolis
Grandy, Alfred William; Bath Gate, N. D.

Greenberg, Jack
Haarlow, Arnold William; Baldwin, Wis.
Hanneman, Rudy William; Plainview
Hanson, William Cornelius; Sleepy Eye
Harris, Leslie; Park River, N. D.
Hauck, Oscar W.; Wood Lake
Higgins, Robert Cloyd Dillon; Sydney, Ohio
Holm, Edward Olaf; Waubay, S. D.
Hughes, Carl Leo; Hope, N. D.
Keller, Frank Raymond; Minneapolis
Kost, Walter Henry; St. Paul
Krejci, Fred Otto; Hutchinson
LaDue, Nelson Vivian; Fertile
Little, Arthur Paul; Appleton
Lyman, Harry Harlan; Caledonia
McBeth, Ewing Cleveland; Spokane, Wash.
McKenzie, Morell Dion; St. Paul
Maker, John Adolph; Lake Crystal
Maland, James William; Rushford
Murphy, Dennis Joseph; Lakefield
Nelson, Harry Wilhelm; Minneapolis
Nelson, Roy Harrison; Hope, N. D.
Oberg, Clarence Emanuel; Minneapolis
Pattridge, Mark Otis; Tracy
Petri, Carl Hjalmar; Minneapolis
Plaas, George Arthur; Red Wing
Reynolds, George Westfall; Minneapolis
Rounds, William T.; Sleepy Eye
Samuels, Harvey Charles; Minneapolis
Saunders, Benjamin Harrison; Parkers Prairie
Shells, Arthur George; West Concord
Smetana, Edward E.; Hopkins
Stangeby, Torlief Ludwig; Minneapolis
Stone, Milton Bian; St. Peter
Thomson, Erwin Emmerson; Minneapolis
Wells, Harry Asa; Minneapolis
Whitney, Harry Carroll; Wessington Springs, S. D.

FIRST YEAR—77

Altermatt, Wallace Adolph; Springfield
Bancroft, John Albert; Blue Mounds, Wis.
Barnum, Elbert Wetherald; Pine City
Brede, Otto Henry; Minneapolis
Bren, Edward James; Tabor
Campbell, William Downer; Wabasha
Clayton, Harry Frederick; St. Paul
Cole, Bert LeRoy; St. Paul
Cooperman, Oscar; Minneapolis
Cornwall, John Thomas; Eveleth
Delmore, Hubert Francis; Marshfield, Wisconsin
De Mots, Edward Gilbert; Sioux Center, Iowa
Deslaurier, Albert Joseph; St. Paul
Dinwoody, George Christian; St. Paul
Doty, Charles Henry, Minneapolis
Dvorak, Edward John
Ernst, Henry William
Fairchild, Guy Buchanan; Grand Forks, N. D.
Flagstad, Carl Oscar
Fossum, Oscar Eilert; St. James
Franchere, Harold; Lake Crystal
Franta, Edward Frank; Montgomery
Gauthier, Victor Edmund; Cloquet
Greene, Henry Stewart; Luverne
Gross, Samuel; Minneapolis
Hagen, Paul; Crookston
Hall, Henry Joseph; Rochester
Harrington, Earl Fremont
Hartl, Frank Joseph; Kiner, N. D.
Hartung, William John; St. James
Haycock, William James; Tracy
Hedman, Carl Edwin; St. Paul
Henderson, James L.; St. Paul
Iltis, Henry Charles; Chaska
Johnson, George Edwald; Minneapolis
Johnston, Warren Wesley; Minneapolis
Kelly, John Patrick; Minneapolis
Larson, George; Atwater
Luhman, Archie; Dorer
Lundquist, Arthur; Minneapolis
McCarthy, Francis Michael; Brainerd
McDougall, William; Royalston
Magnuson, Frank Arthur; St. Paul
Majerus, John; Helena, Montana
Maves, Theodore William; St. Peter
Maybury, Richard Samuel; St. Cloud
Monroe, William Hutchinson
Moore, William Arthur; Chatfield
Mulligan, William Howard; Minneapolis
Oien, Gerhard Oseander; Boyd
Oram, Warren Wright; Willmar
Peterson, Johan Ferdinand; Bemidji
Porter, Walter Raymond; Willmar
Radermacher, Ralph James; Le Seuer Center
Rauch, Benjamin; Minneapolis
Rexford, Sidney Mark; Spring Valley
Rieke, Harvey Wesley; Fairfax
Ritchie, Hugh; Cannon Falls

Roll, William August; Clontarf
Rosen, Maurice Calvin; Minneapolis
Rudolph, Charles Eugene; Annandale
Seifert, Arthur Vincent; New Ulm
Sieberg, Edward; Oakes, N. D.
Smith, Harvey Willrad; Verndale
Steinfeldt, Abe Arnold; Minneapolis
Stickney, Truman Leander; Minneapolis
Thomas, James Alfred; Spencer, Iowa
Thorburn, Lloyd Mungo; Marshall
Van Gilder, Jesse Stillman; Cannon Falls
Vig, Richard; Fosston
Walhus, Martin J.; Spring Grove
Walters, Kenneth Hugo; Caselton, N. D.
Washburn, Dwight Wells; Plainview
Weeks, Arthur Freeman; Litchfield
Williams, Robert Edgar; Akeley
Wolf, George Emil; St. Paul
Ziegler, Sam; Stillwater

SPECIALS—19

Benjamin, Harley George; Minneapolis
Brady, Charles Patrick; Red Lake Falls
Britzuis, Harry Adam; Minneapolis
Broderson, Clarence C.;. Fountain City, Wisconsin
Capron, Harry; Minneapolis
Carpenter, Dwight Jefferson; Minneapolis
Chapman, LeRoy Marion; Lanesboro
Conway, Steven Vincent; Minneapolis
Donald, Raymond Bristol; Minneapolis
Ertl, Rudolph William; Minneapolis
Ingersoll, Howard George; Brainerd
Kaiser, Frederick John; Wells
Mittwer, Arthur Edward; Minneapolis
Moorhouse, Raymond Richard; Minneapolis
Remele, Herman Charles; Minneapolis
Ringnell, Ernest Berrhart; Minneapolis
Schmid, Adolph Robert; Springfield
Scott, Louis William; Waseca
Verne, Paul Conrad; Minneapolis

The College of Pharmacy

SENIORS

—Austin, Alberta J. Millbank, S. D.
Becker, Frank A. Olivia, Minn.
Budde, Emil M., 502 Bryant Av. N., Minneapolis.
Bugbee, Guy C., Paynesville, Minn
—Carlson, Helma, Erskine, Minn.
Carlson, A. E., Willmar, Minn.
Casey, J. Ambrose, Aitkin, Minn.
—Caton, Charlotte E., 2441 Bloomington Ave., Minneapolis.
Cleveland, Zina, Northfield, Minn.
Colby, Hans C., Jackson, Minn.
Diessner, Chas. O., Waconia, Minn.
Doty, Archie C., Eyota, Minn.
Earle, Fred W., Rochester, Minn.
Errickson, Wm. A., Cashton, Wis.
Fratzke, Theodore, Eyota, Minn.
—Gjerdingen, Nathalia L., Halstad, Minn.
Green, Everard L., Hankinson, N. D.
Hamilton, Horace L., St. Louis Park, Minn.
Hawlish, Jos. E., Hopkins, Minn.
—Heath, M. Grace, Riga, N. D.
Hohn, Walter G., Buffalo, Minn.
Hooper, Archie J., Minneapolis.
Hotveidt, Elmer L., Eau Claire, Wis.
Kelly, John V., 237 St. Albans, St. Paul
Kleinhuizen, Albert E., Raymond, Minn.
Klovstadt, Thomas, Milan, Minn.
Kusterman, Fred G., St. Cloud, Minn.
Leikvold, Albert I., Waterville, Iowa.
—Lyman, Emily L., Graceville, Minn.
—Maxwell, Hazel, 561 Oakland Ave. St. Paul
McMiller, Paul R., Carrington, N. D.
Munro, Will R., Cummings, N. D.
Nesse, Ella H., Mabel, Minn.
Orr, Merton J., Bismarck, N. D.
Parker, Claude H.; 408 2nd Ave., S. E., Minneapolis.
Paulson, Carl A., 3602 Central Ave., Minneapolis, Minn.
Peterson, Hugo, O., 1921 9th Avt. South, Minneapolis.
—Peyton, Agnes, Wheaton, Minn.
Reierson, Carl R., Spring Grove, Minn.
Root, Nelson W., Elysian, Minn.
Schreiter, Norman C., Red Lake Falls, Minn.

Sievert, Arthur F., New Richland, Minn.
Speidel, Harry W., Ladysmith, Wis.
Spellman, Clyde A., Montevideo, Minn.
Tyrholm, Harold A., New Richland, Minn.
Van Campen, Harry A., Cannon Falls, Minn.
Welch, Leo S., Glencoe, Minn.
Wolf, George E., Olivia, Minn.
Yamagishi, Kozo, Kobe, Japan
Zender, Chas. H., Henry, S. D.

JUNIORS

Adams, Edward M., Wayzata, Minn.
Ash, Benedict S., Delano, Minn.
Bersing, Delbert E., Blair, Wis.
Butterfield, Frederick R., Industry, Ill.
Carman, J. A., Detroit, Minn.
Courtney, John F. Glenwood, Minn.
Doeltz, Otto Paul, 3335 Columbus Ave. Minneapolis.
Doerr, Harry, 327 Oak Grove, Minneapolis
Ebeltoft, William H., Lake Park, Minn.
Emmans, Floyd, Minneapolis.
Errickson, Carl A., Cashton, Wis.
—Meadowcroft, Grace, Ruso, N. D.
Minsky, Alfred, 427 Lyndale Ave., North, Minneapolis.
Monson, Martin J., Delhi, Minn.
Noer, Victor R., Colfax, Wis.
Nordstrom, Burt A., Sacred Heart, Minn.
Olverson, Oscar A., Clark, S. D.
Paine, S. S., Lake City, Minn.
Peters, William M., 1016 13th Ave., South Minneapolis.
Parker, Claude H., 408 2d Ave., S. E. Minneapolis.
Hanson, Harry Rochester, Minn.
Harding, Chester E., Delta, Colorado.
Hare, Joseph, Jr., Bismarck, N. D.
Haynes, Manley H., 703 River Road E., Minneapolis.
Henton, Jay C., Morton, Minn.
Homerberg, Victor, Hopkins, Minn.
Hoppe, William F., Breckenridge, Minn.
Hughes, Stuart, 1369 Spruce Place, Minneapolis.
James, Chas. W., Rochester, Minn
Janecky, Geo. A.; Hutchinson, Minn
Jepson, Paul, Nashua, Iowa.
Johnson, Theodore, Parker's Prairie, M
Kellam, A. B., Heron Lake, Minn
Kelly, Chas. F., Webster, S. D.
Lundberg, Wm. W., Brownton, Minn.
Marsh, Edward M., Pine Island, Minn.
—Mathewson, Vera M., 3617 Blaisdell Ave., Minneapolis.
Paulson, Carl M., 2602 Central Ave., Minneapolis.
—Ponthan, Marie W., St. Paul.
—Remes, Anastasia M., New Prague, Minn.
Reum, Arthur, Minneapolis.
—Skartum, Juanita M., Lake Benton, Minn.
Slawson, Frank W., 511 15th Ave., S.E. Minneapolis.
—Snyder, Bessie E., Hector, Minn.
Souba, Emil Geo., Hopkins, Minn.
Spengler, W. A.. 734 Ottawa Av. St. Paul.
Spiegel, Louis, 1523 East 19th St., Minneapolis.
Steiner, F. A., Mankato.
Titus, James L., Berea, Kentucky.
Whittemore, Andrew A., Detroit, Minn.
Yamagishi, Kozo, Kobe, Japan.

The School of Mines

SENIORS—12

Cole, Willard, Lisbon, N. D.
Conkey, Charles R., Minneapolis.
Crowley, Jay, Stillwater.
Gavin, Lawrence T., Staples.
Grant, Royal C., Duluth.
Hognason, Guy B., Minneota.
Hoyt, Samuel, Minneapolis.
Rood, Lynn, St. Paul.
Santo, Julius H., Janesville.
Swanson, Axel, Monticello.
Taylor, Harold G., Minneapolis.
Williams, Homer A., Minneapolis.

JUNIORS—28

Bills, E. L., Minneapolis.
Chesley, J. G., Minneapolis.
Devereux, Lawrence, Minneapolis.
Duncan, Kenneth J., Fergus Falls.
Farnam, Henry E., Minneapolis.
Giltinan, George M., St. Paul.
Goodrich, Norman P., Minneapolis.
Harmon, Benjamin G., St Paul.
Heath, Clarence L., Janesville.
Heidel, Charles S., Minneapolis.
Herring, William E., Blue Earth.
Holler, Fred W., St. Paul.
Jacobsen, Harry, Fergus Falls.
Johnson, Algot F., Cannon Falls.
Jones, Ernest, Red Wing.
Kennedy, Arthur T., Duluth.
Larson, Clarence L., Waseca.
Leonard, Forest M., Minneapolis.
McKenzie, James R., Adrian.
Moody, R. G., Minneapolis.
Newell, John, Shakopee.
Ostrand, Peter M., Atwater.
Quade, Edward H., Janesville.
Simpson, William F., Minneapolis.
Stewart, Gordon, Monticello.
Strane, Archie, St. Paul.
Sundness, Odin A., Fergus Falls.
Thomas, Clarence J., Minneapolis.

SOPHOMORES—49

Abbott, Le Roy, St. Peter.
Abbott, Theodore S., St. Paul.
Anderson, Joseph, Florence.
Anderson, Walter O., Hopkins.
Bailey, Paul T.. Minneapolis.
Baker, Emory P., Minneapolis.
Beck, Chas. S., Lewiston.
Borgeson, Anshelm C., Minneapolis.
Burgess, Robert J., Minneapolis.
Carson, Clark J., Glenwood.
Cooke, Hamilton, St. Louis, Mo.
Crouse, Stevens, Minneapolis.
Dickinson, Roy E., Minneapolis.
Drake, George M., Madelia.
Ekloff, Victor E., Cokato.
Elliott, Jay R., Minneapolis.
Fixen, Victor L., Minneapolis.
Flanner, Edwin T., Minneapolis.
Fosness, Arthur W., Lakefield.
Hill, Arthur S., Minneapolis
Hurley, John J., Pine City.
Hyatt, Frank L., Minneapolis.
Jahn, William F., Winona.
Kingsley, Neil S., Minneapolis.
Kleinschmidt, Clarence, St. Paul.
Lawton, J. Edward, Worthington.
Lewis, John W., Minneapolis.
Lindholm, Milton, Ortonville.
McCullough, Erwin, Minneapolis.
Martin, Dean W., Minneapolis.
Martin, Lynn, Grand Meadow.
Maves, Theodore W., St. Peter.
Melchior, Claude B., Hutchinson.
Meyer, William, Minneapolis.
Miller, Emil J., Hopkins.
Milnor, Walter S., Minneapolis.
O'Brien, Charles, St. Paul.
Perry, Joe B., Minneapolis.
Rahilly, Harold, Minneapolis.
Schuster, Carl H., Rochester.
Snyder, Leslie, Minneapolis.
Snyder, S. O., Minneapolis.
Tetlie, John R., Canton, S. D.
Turner, H. Milton, Crookston.
Victor, Albin F., Lindstrom.
Walker, E. Harold, Minneapolis.
Walters, Chas. W., St. Paul.
Wehr, Arthur J., St. Paul.
Whitson, Lloyd R., Fergus Falls.

FRESHMEN—61

Awrey, Bruce, Hawley.
Bentley, Frank, Minneapolis.
Bjorge, Guy, Duluth.
Bohland, Carl P., St. Paul.
Brosius, Ernest, Minneapolis.
Burns, Donald S., South St. Paul.
Burris, William W., Duluth.
Case, Leland I., Minneapolis.
Christie, David R., Minneapolis.
Cirkel, Scott, Minneapolis.
Claypool, J. Verner, Duluth.
Cohen, Julius, Minneapolis.
Coventry, Edward D., Duluth.
Danish, Samuel, Minneapolis.
d'Autremont, Charles M., Duluth.
Deringer, Walter O., St. Paul.

Dickson, Robert, Minneapolis.
Edwards, Junius D., Minneapolis.
Englund, Arthur, Starbuck.
Fabian, John H., Campbell.
Hagstrom, Leonard J., Minneapolis.
Halloran, Joseph E., Langdon, N. D.
Harrington, George L., Langdon.
Haskill, Isom W., Pipestone.
Hawley, R. W., Minneapolis.
Hayward, Josiah, St. Cloud.
Hewitt, Ezra A., Minneapolis
Jenswold, John D., Duluth.
Johnson, Roy, Casselton, N. D.
Kennedy, Charles T., Eau Claire, Wis.
Klossner, Howard J., New Ulm.
Knox, Lafayette, Grand Rapids.
Kremer, Edward G., Grand Rapids.
Larrabee, Orin Minneapolis.
Lea, John, Minneapolis.
Lee, Theodore L., Ellendale, N. D.
Lyon, Chalmer, Minneapolis.
McAdams, Howard R., Duluth.
McClintock, Thomas, Rugby, N. D.
Michie, Roy G., Montevideo.
Murray, Emmett, London, O.
Olson, Alfred W., Argyle.
Olson, Walter S., St. Paul
†Packard, William D., Jr., St Paul.
Patterson, William, Minneapolis.
Prouty, Roswell W., St. Paul.
Quinn, Max F., Spokane, Wash.
Schapler, Harry F., Pipestone.
Schultz, Max F., New Salem, N. D.
Simons, Leighton, Virginia.
Smith, C. C., St. Paul.
Spicer, Raymond, Willmar.
Stevens, Howard, Stillwater.
Taylor, W L., Dundas.
Teasdale William M., St. Paul
Underhill, Russell, Stillwater
Wallinder, Arthur, Duluth.
Walter, Rollie B., Delano
Williams, James, Ely.
Woodis, Clarke M., Amboy.
Youell, Harold, Minneapolis.

†Died Jan. 1909.

The School of Chemistry

SENIORS, 10.

Bacon, Charles B., St. Paul.
Barnaby, William E., Minneapolis.
Dresser, Eva, Minneapolis.
Kueffner, Otto K., St. Paul.
Morey, George W., Minneapolis.
Nye, Lillian, Minneapolis.
Roehrich, Victor H., St. Paul.
Selvig, Walter, Willmar.
Sterling, Faith, Minneapolis.
Walker, George Warren, Minneapolis.

JUNIORS, 17.

Bicknell, Henry R., Minneapolis.
Daniels, Farrington, Minneapolis.
De Witt, Joseph H., Red Wing.
Dietrichson, J. Gerhard, Menomonie, Wis.
Gutsche, Frank C., Glencoe.
Johnson, Einer, Minneapolis.
Johnston, William W., Minneapolis.
Kepner, Ben Hur, Appleton.
Mitchell, Donald F., Minneapolis.
Peterson, Andrew P., Lamberton.
Rockwood, Ralph H., Madelia.
Smith, Carolyn, Minneapolis.
Smith, Sheldon H., St. Paul.
Stone, G. Harwood, Omro, Wis.
Taylor, Carl H., Minneapolis.
Tronson, Carl, Benson.
Woollett, Guy, Minneapolis.

SOPHOMORES, 7.

Baker, Russell E., Minneapolis.
Callaway, Roy S., Minneapolis.
Dunn, Lewis E., Minneapolis.
Guffin, Roy, Minneapolis.
Halvorson, Henry A., Minneapolis.
Leavenworth, Frank M., Minneapolis.
Wanless, Lynn A., Anoka.

FRESHMEN, 27.

Birkholz, Emil, Minneapolis.
Blase, Henry G., St. Paul.
Brooks, Loren R., Minneapolis.
Bush, Clarence A., Minneapolis.

Cantwell, William F., Minneapolis.
Cohen, Jacob G., Minneapolis.
Curtis, Carolyn, White Bear.
Daniels, Elmer A., Pine Island.
Dean, Graham W., Eau Claire, Wis.
Frisch, Leonard H., Minneapolis.
Gardner, Charles A., Minneapolis.
Hall, Otis W., Elk River.
Hare, Heber R., St. Paul.
Harshaw, John R., Minneapolis.
Hoffmann, Henry J., St. Paul.
Karatz, Lucian, Minneapolis.
McLeod, John R., Minneapolis.
Martin, Edmund W., Winona.
Mitchell, Ralph W., Minneapolis.
Nesse, Charles O., Mabel.
Newman, Loretto, St. Paul.
Parkin, Guy G., Pine Island.
Schmidt, George H., New Ulm.
Spriestersbach, David O., St. Paul.
Williams, Perry S., St. Paul.
Wendel, J. H., Minneapolis.
Young, Arthur Donald, Mankato.

UNCLASSED, 19.

Arnold, Henry M., Minneapolis.
Bolton, John B., Minneapolis.
Buswell, Arthur M., Minneapolis.
Cornog, Jay, Minneapolis.
Ferriss, Ben C., St. Paul.
Finke, Wilbur W., Charles City, Iowa.
Hartnett, John D., Graceville.
Hennessy, Hugh J., Minneapolis.
McMiller, P. Raymond, Minneapolis.
Myers, James, I., Great Falls, Mont.
Olson, A. Orlando, North St. Paul.
Pettijohn, Earl, St. Paul.
Robinson, Rhea B., Minneapolis.
Schroeder, William F., Lester Prairie.
Shima, Rynjen, Minneapolis.
Starr, Elizabeth, Minneapolis.
Stone, Wylie W., Benson.
Stoppel, Ernest A., Rochester.
Thayer, Allan C., Minneapolis.

The College of Education

SENIORS—15

Alice Austin, Minneapolis.
George Bakalyar, Lakefield.
Ellen I. Burk, Minneapolis.
Anna C. Carlson, St. Cloud.
Melva A. Collins, St. Paul.
John D. Gilpin, Minneapolis.
Blanche Hellickson, Mabel.
Marie Alden Hewitt, Minneapolis.
Frances McOuat, Minneapolis.
Jennie Murfin, Minneapolis.
William W. Norton, Minneapolis.
Alice R. Quigley, Bird Island.
N. Robert Ringdahl, Minneapolis.
Mira M. Southworth, Minneapolis.
Amanda M. Whaley, St. Paul.

JUNIORS—13

Agnes Bryan, Rochester.
Thomas Cahill, Minneapolis.
Verna M. Hart, Minneapolis.
Jensine M. Miller, Minneapolis.
Richard Molenaar, Raymond.
Abigail O'Leary, Wabasha.
Eva L. Pitts, Alton, Ia.
Grace E. Richards, Minneapolis.
Jessie S. Schneider, St. Paul.
Charlotte Smith, Montevideo.
Lillian Spain, Minneapolis.
Esther Stoft, Minneapolis.
Olivia Trautman, Minneapolis.

UNCLASSED—13

Kate Bartholf, Minneapolis.
Alline C. Bayrell, Minneapolis.
Annie M. Hayes, Minneapolis.
Bridget T. Hayes, Minneapolis.

Harry W. Kavel, Minneapolis.
Alice Kilgore, Minneapolis.
Hermine R. Konig, Minneapolis.
Mary O. Lothrop, Minneapolis.
E. E. Heeter, Manchester, Ind.
W. C. Herrmann, Winona.
M. Edna Morrison, Minneapolis.
Ernest Reynolds, Minneapolis.
Anna M. Schulte, Minneapolis.

The Graduate School

CANDIDATES FOR DEGREES OF JUNE 1909

FOR DOCTOR OF PHILOSOPHY—4

Gustav O. Brohough, Red Wing.
B. A. '89, LL.B., '93, Minnesota,
M. A. '06, Wisconsin.
Major, Economics.
Minors, Public Finance, Sociology.
Thesis, The Minnesota Pine Lands.

Ernest C. Carlton, St. Peter.
B. A. '98, M. A. '00, Augustana.
Major, Scandinavian.
Minors, Greek, English.
Thesis, Oscar Levertin, A Study of Literary Development.

Ernest J. Colberg, St. Peter
B. A. '06, Gustavus Adolphus.
M. A. '08, Minnesota.
Major, English.
Minor, Scandinavian, Latin.
Thesis, The Development of the English Essay.

Alois F. Kovarik, Minneapolis.
B. A. '04, M. A. '07, Minnesota.
Major, Experimental Physics.
Minors, Mathematical Physics, Mechanics.
Thesis, The Effect of Changes in the Pressure and Temperature of a Gas upon the Velocity of the Negative Ions Produced by Ultra-Violet Light.

FOR DOCTOR OF SCIENCE—1

William Macdonald, Pretoria, S. Africa.
B. S. '98, Ph. D. '07, Minnesota, M. S. Agr., '01, Cornell University.
Major, Agriculture.
Minors, Dry-Farming and Land Settlement.
Thesis, Agricultural Education.

FOR MASTER OF ARTS—30

Bonnie F. Andrews, Sisseton, S. D.
B. A. '03, Minnesota.
Major, English.
Minor, Latin.
Thesis, Si Wahpa, A Historical Romance.

Marion L. Barber, Minneapolis.
B. A. '08, Minnesota.
KEM—
Major, English.
Minors, German, French.
Thesis, The Development of the Modern Theater.

Laura H. Benz, St. Paul.
B. A. '08, Minnesota.
Major, English.
Minors, Sociology, German.
Thesis, The Play and the Playgoer.

Edla G. Berger, St. Paul.
B. A. '07, Minnesota.
Major, Mathematics.
Minors, Astronomy, Latin.
Thesis, Line Geometry in the Plane.

Helen D. Donald, St. Paul,
B. L. '06, Carleton.
Major, Sociology.
Minor, History.
Thesis, The Associated Charities.

Albert N. Gilbertson, Minneapolis.
B. A. '08, Minnesota.
Major, Sociology and Anthropology.
Minors, Psychology, Philosophy.
Thesis, Pre-Christian Survivals in the Festivals, Customs and Symbols of the Christian Church.

Adella Hawes, Minneapolis.
B. A. '08, Wells.
Major, English.
Minors, Physiography, Sociology.
Thesis, Social Sympathy in the Drama.
Edgar C. Higbie, Canby.
B. A. '07, Minnesota.
Major, Education.
Minor, Agriculture.
Thesis, The Present Problem in Agricultural Education.
Jessie H. Horn, St. Paul.
B. A. '06, Minnesota.
Major, History
Minors, English, Spanish.
Thesis, Food-Price Legislation in Massachusetts from 1630-1649.
Olaf Hovda, Minneapolis.
B. A. '04, Minnesota.
Major, Physics.
Minor, Mechanics.
Thesis, The Temperature Coefficients of Moving Coil Galvanometers.
Drusilla Hutchinson, Minneapolis.
B. A. '01, Minnesota.
Major, History.
Minors, Philosophy, English.
Thesis, The Diplomacy in Connection with the Trade between the United States and the British West Indies from 1783 to 1830.
Emil Johnson, Minneapolis.
B. S. '06, St. Olaf.
Majors, Education and Psychology.
Thesis, Children's Difficulties in Arithmetic.
A. Walford Johnson, Minneapolis.
B. A. '08, Augustana.
Major, Geology.
Minors, Chemistry, Mineralogy.
Thesis, The Glacial Geology of Minnesota.
Arnold J. Lien, Delavan.
B. A. '08, Minnesota.
Major, Political Science.
Minors, History, Economics.
Thesis, Highway Legislation in Minnesota.
Martin Lien, Atwater.
B. S. '07, St. Olaf.
Major, Education.
Minors, Psychology, Scandinavian.
Thesis, More Parochial Instruction among Norwegian Lutherans of America.
Ingebright L. Lillehei, Luverne.
B. A. '08, Minnesota.
Major, Philosophy.
Minors, English, French.
Thesis, The Ethics of Nietzsche.
Frank E. Moll, Wahpeton, N. D.
B. A. '87, Charles City, Ia.
S. T. B. '93, Northwestern.
Major, German.
Minors, French, Spanish.
Thesis, The Satirical Element in the Writers of the Reformation, especially Brant, Murner, and Fischart.
Peter O. Okkelberg, Goodhue.
B. A. '06, Minnesota.
Major, Embryology.
Minors, Zoology, Ecology.
Thesis, The Neuromast System in the Ichtheopsida Lepisosthius.
Matthias N. Olson, Belview.
B. A. '08, Minnesota.
Major, Political Science.
Minors, History, Economics.
Thesis, Public Land Policy in Minnesota.
Alice G. Pope, Minneapolis.
B. A. '08, Minnesota.
Major, History.
Minors, English, Economics.
Thesis, The Composition of the Council of the North during the Reign of Elizabeth.
Frances S. Potter, Minneapolis.
B. A. '87, M. A. '89, Elmira, N. Y.
Major, English.
Minors, Anglo Saxon, Milton.
Thesis, Works of Fiction published by the Candidate.
Lydia A. Schroedel, St. Paul.
B. A. '08, Macalester.
Major, Comparative Philology.
Minors, German, English.
Thesis, The Comparison of some Synonyms in Beowulf, the Heliand and Otfrid.
Eleanor Sheldon, Minneapolis.
B. A. '04, Minnesota.
Major, English.
Minors, Rhetoric, German.
Thesis, Gerhardt Hauptman, Dramatist and Poet.
Maud H. Steward, Minneapolis.
B. A. '05, Minnesota.
Major, English.
Minors, Drawing, Sociology.

Thesis, The Spanish Drama.
Peter A. Sveeggen, Minneapolis.
B. A. '08, Minnesota.
Major, English.
Minors, Philosophy, Scandinavian.
Thesis, The Formal and the Vital in Literature.
Christian Trygstad, Rapid City, Ia.
B. A. '05, St. Olaf.
Major, German.
Minors, Latin, French.
Thesis, Heinrich von Kleinst and the Romantic School.
Victor A. Valgren, Minneapolis.
B. A. '05, Gustavus Adolphus.
Major, Economics.
Minor, Political Science.
Thesis, The City and the Water Supply.
Arland D. Weeks, Agric. College, N. D.
B. A. '01, Cornell.
Major, Education.
Minors, Psychology, one-half graduate work done at Cornell.
Thesis, The Place of Agricultural Education.
John Hersey Wheeler, St. Paul.
B. A. '96, Harvard.
Major, Romance Philology.
Minors, Italian, Comparative Philology.
Thesis, History of the Literary Relations between France and the United States.
Nellie A. Whitney, Minneapolis.
B. L. '00, Minnesota.
Major, English.
Minors, Philosophy, German.
Thesis, A Comparative Study of Some Types of the Essay.

For Master of Science—6

Walter L. Badger, Minneapolis.
B. A. '07, B. S. '08, Minnesota.
Major, Electro-Chemistry.
Minors, Physics, Electrical Engineering.
Thesis, The Electrolytic Preparation of the Alkaline-Earth Metals.
Hobart D. Frary, Minneapolis.
M. E. '08, Minnesota.
Major, Mechanical Engineering.
Minors, Electrical Engineering, Economics and Political Science.
Thesis, A Study of Smoke Prevention in Steam Boiler Plants, especially in Minneapolis.
George P. Grout, St. Paul.
B. S. '08, N. Dak. Agric.
Major, Animal Nutrition.
Minors, Bacteriology of Milk, Animal Husbandry.
Thesis, Farm Management.
Daniel B. Howells, St. Paul.
Ph. B. '06, Wisconsin.
Major, Animal Nutrition.
Minors, Chemistry, Dairying.
Thesis, Relation of Feed to Product.
Louis W. McKeehan, Minneapolis.
B. S. '08, Minnesota.
Major, Physics.
Minors, Mathematical Physics, Astronomy.
Thesis, An Experimental Determination of the Terminal Velocity of Fall of Small Spheres in Air.
L. C. Tomlinson, Glencoe.
E. E. '04, Minnesota.
Major, Telephone Engineering.
Minors, Gas Engines, Economics.
Thesis, The Disturbance Caused by Electro-Magnetic Waves in Telephony

LIST OF CANDIDATES ENROLLED

For Doctor of Philosophy—14

Theodore A. Buenger, St. Louis
B. A. '06, M. A. '07, Minnesota.
Major, Latin.
Kelvin Burns, Minneapolis.
B. A. '03, Minnesota.
Major, Astronomy.
Minors, Mathematics, Physics.
Thesis, A Study of the Proper Motions and Parallaxes of Stars in the Nebula of Orion.
Lillian Cohen, Minneapolis.
B. A. '00, M. S. '01, Minnesota.
Major, Chemistry.
Minors, Food Analysis, Physics.
Hal Downey, Minneapolis.
B. A. '03, M. A. '04, Minnesota.
Major, Animal Biology.
Minors, Anatomy, Neurology.
Thesis, The Lymphatic Tissue of the Kidney of Polyodon Spathula.

George R. Eichholzer, St. Anthony Park.
B. A. '07, M. A. '08, Minnesota.
Major, Political Science.
Minor, German.

Francis C. Frary, Minneapolis.
B. S. '05, M. S. '06, Minnesota
Major, Chemistry.
Minor, Electrical Engineering.

Charles E. Johnson, Minneapolis.
B. A. '06, M. A. '07, Minnesota.
Minors, General Physiology, Insect Fertilization of Plants.

Mrs. Julia M. Johnson, Macalester College.
M. A. '05, Minnesota.
Major, English.
Minors, Latin, Philosophy.

Rasmus Malmin, Decorah, Ia.
B. A. '82, M. A. '06, Luther College.
Major, Hebrew.
Minors, Aramaic, Jewish History.

Gustav Melby, Minneapolis.
M. A. '06, Minnesota.
Major, English.
Minors, Comparative Philology, German.

Carl M. Melom, Minneapolis.
B. L. '01, M. A. '02, Minnesota.
Major, Spanish.
Minors, Old Spanish, French.
Thesis, The True Sources of the Cid

Rasmus E. Saby, Radcliffe, Ia.
B. A. '07, M. A. '08, Minnesota.
Major, Political Science.
Minors, Economics, Philosophy.

Ray Albion Vickery, Washington, D. C.
B. A. '06, M. A. '07 Minnesota.
Major, Animal Biology.
Minor, Botany.

John Hersey Wheeler, St. Paul.
B. A. '96 Harvard.
Major, Romance Philology.
Minors, Italian, Comparative Philology.
Thesis, The History of the Literary Relations of France and the United States.

For Master of Arts—33

Franz A. Aust, Minneapolis.
B. A. '08, Minnesota.
Physics, Sociology, Political Science.

Belle V. Bonsteel, Minneapolis.
B. A. '06, Minnesota.
English, German.
The Psychology of Blank Verse.

Thyra Crawford, Minneapolis.
B. A.' 03, Woman's College, Baltimore.
German, English, Philosophy.

Helen S. Cummings, St. Paul.
B. A. '08, Minnesota.
Sociology, English.

Niel S. Dungay, Northfield.
B. A. '04, Minnesota.
Embryology, Geology, Animal Behavior.

Austin S. Edwards, Minneapolis.
B. S. '08, Columbia.
Education, Psychology.

Josephine W. Elston, Minneapolis.
B. A. '08, Knox.
Economics, Political Science.
The Case of Socialism.

Byron T. Emerson, Minneapolis.
B. A. '03, Minnesota.
Chemistry.

Leland J. Farmer, Annandale.
B. A. '00, St. Laurence U.
Education, Psychology.

Emma C. Freeman, St. Paul.
B. A. '94, Minnesota.
German.

Ruby H. Fletcher, Minneapolis.
B. A. '08, Minnesota
Botany, Geology, Biology.

Mary Gibson, Minneapolis.
B. A. '05, Minnesota.
Latin, Philosophy.

Raymond H. Gray, Elk River.
B. A. '05, Minnesota.
Education, Psychology.

Amos Grothe, Elk Point, S. D.
B. A. '05, St. Olaf.
English, Latin, Education.
The Interrelation of Modern Fiction and Drama.

F. B. Harrington, Langdon.
B. A. '07, Oberlin.
Education, Pschology.

Newton H. Hegel, Cambridge.
B. A. '03, Minnesota.
Education, Psychology.

Albert Hegstrom, Kennedy.
B. A. '03, Gustavus Adolphus.
Education, Psychology

Alfred O. Holte, Gary.
B. A. '08, Luther.
Comparative Philology, Scandinavian, Education.
Iver F. Johnsrud, St. Cloud.
B. A. '03, Minnesota.
Education, Psychology.
A. Ray Kent, Lanesboro.
B. A. '03, Cornell College.
Education, Psychology.
Inez A. Kelsey, Anoka.
B. A. '05, Minnesota.
Education, Economics, Latin.
Emil F. Lee, Hanska.
B. S. '08, St. Olaf.
English, Education, Scandinavian.
Anna E. Maguire, St. Paul.
B. A. '03, Nebraska.
English, History, Philosophy.
O. J. Ole, Minneapolis.
B. A. '07, Macalester.
Philosophy, History, Scandinavian.
Phebe L. Pearsall, Minneapolis.
B. A. '04, Beloit.
Bacteriology, Neurology, Botany.
A. C. Pederson, Benson.
B. A. '04, Luther.
English, Philosophy.
Eugene Routier, Madagascar.
B. A. '08, St. Olaf's.
Political Science, Economics, History.
Thos. W. Ruger, Devils Lake, N. D.
B. A. '05, Minnesota.
Sociology, History, English.
Knut A. Rygh, Mound City, S. D.
B. A. '06, St. Olaf.
Education, Psychology.
Dorothea Stewart, Minneapolis.
B. A. '08, Minnesota.
Geology.
M. Hauman Thorsen, River Falls, Wis.
B. A. '07, Luther.
Education, Psychology, Logic.
Margaret H. Trimble, Minneapolis.
B. A. '08, Minnesota.
English.
Orson M. Washburn, Waterville.
B. A. '97, Minnesota.
Education, Psychology.

FOR MASTER OF SCIENCE—4

Edward X. Anderson, Minneapolis.
B. S. '08, Minnesota.
Major, Physical Chemistry.
Minor, Mineralogy.
Thesis, The Nucleation of Pure and Mixed Vapors in Dust-free Air.
Charles R. Cressy, Minneapolis.
B. S. '08, Minnesota.
Major, Chemistry.
Minor, Mineralogy.
Thesis, The Analysis of Coal.
A. R. Kohler, St. Anthony Park.
B. S. Agr. '06 Iowa State.
Plant Breeding, Plant Pathology, Economics.
Isaac F. Metcalf, St. Anthony Park.
B. S. Agr. '08 Guelph Arg. College.
Plant Breading, Agricultural Economics, Dry-Farming.

STUDENTS TAKING GRADUATE WORK

NOT ENROLLED AS CANDIDATES FOR DEGREES—35

Walter J. Beggs, St. Paul.
B. A. '99, M. A. '00, Harvard.
Latin, French.
Anne Benton, Minneapolis.
B. A. '08, Wellesley.
Chemistry, English.
Marjorie Bullard, St. Paul.
B. A. '06, Minnesota.
History.
Polly C. Bullard, St. Paul.
B. A '06, Minnesota.
History, English.
Henry F. Burt, Minneapolis.
B. A. '93, Washburn.
Economics.
Anna J. Campbell, Hopkins.
B. A. '07, Minnesota.
English.
Esther Celin, Cokato.
B. A. '06, Gustavus Adolphus.
German.

Mrs. F. E. Clements, Minneapolis.
B. A. '98, Ph. D. '04, Nebraska.
Botany.
Mabel Cooper, St. Paul.
B. A. '08, Wellesley.
German.
Ada E. Davis, Minneapolis.
B. A. '08, Wellesley.
English, Economics.
Dorothy Derickson, Minneapolis.
B. A. '08, Wells.
Rhetoric, English.
Kate T. Finkle, Minneapolis.
B. A. '05, Minnesota.
English, Political Science.
Henry D. Funk, St. Paul.
M. A. '03, Minnesota.
History.
F. W. Gates, Minneapolis.
Ph. B. '99, Wisconsin.
M. A. '07, Minnesota.
Astronomy.
Augustus Hallstone, Mabel.
B. A. '02, Luther.
Economics, Political Science, History.
Carolyn Joyce, Minneapolis.
B. A. '08, Wells.
English.
Margaret M. E. Kelley, St. Paul.
B. A. '08, Minnesota.
Geology, Sociology.
Abbie B. Langmaid, Granite Falls.
B. A. '98, Minnesota.
English, Economics.
Margolie Lewis, St. Paul.
B A. '08, Minnesota.
Astronomy, Physics.
George N. Link, Minneapolis.
B. S. '98, Wisconsin.
Mathematics, French.
V. R. Manning, Minneapolis.
B. A. '08, Minnesota.
Sociology
Cora E. Marlowe, St. Paul.
B. A. '00, Minnesota.
English.
Karl A. Machetanz, St. Anthony Park.
LL. B. '08, Minnesota.
Political Science, English.
Mrs. Frances J. Nichels, Minneapolis.
B. A. '98, M. A. '99, Columbian U.
English.
F. W. Plummer, St. Paul.
B. A. '08, Wabash.
Biology.
Eva Jerome Sardeson, Owatonna.
B. A. '99, Minnesota.
Education, English.
John P. Schumacher, St. Paul.
B. A. '08, Hamline.
English, Anglo Saxon.
William H. Shepherd, Minneapolis.
Ph. B. '00, M. A. '07, Wisconsin.
History, Political Science.
Samuel O. Severson, Minneapolis.
B. A. '03, M. A. '04, Minnesota.
English.
Mary C. Smith, Minneapolis.
B. A. '06, Smith.
English, Psychology.
Freda L. Stamm, St. Paul.
B. A. '07, Minnesota.
German, English.
David L. Tilderquist, Duluth.
M. D. '03, Minnesota.
Anatomy.
Annalee Weiskopf, Minneapolis.
B. A. '08, Wellesley.
English.
Beata Werdenhoff, Minneapolis.
B. A. '08, Wellesley.
Scandinavian.
Jacob Wulfsberg, St. Paul.
B. A. '05, Luther.
History, Psychology.

Summary of Students

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS.

	Men	Women	Total	
Senior Class	61	136	197	
Junior Class	71	193	264	
Sophomore Class	111	197	308	
Freshman Class	160	262	422	
Unclassed Students	89	114	203	
	492	902	1394	1394

Six-Year Medical Course.

	Men	Women	Total	
Sophomore Class	39	3	42	
Freshman Class	51	7	58	
	90	10	100	100

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS.

Senior Class—

	Men	Women	Total
Civil Engineering section	17	..	17
Mechanical Engineering section	21	..	21
Electrical Engineering section	29	..	29
Municipal Engineering section	1	..	1
Science and Technology	4	..	4
	72	..	72

Junior Class—

	Men	Women	Total
Civil Engineering section	27	..	27
Mechanical Engineering section	24	..	24
Electrical Engineering section	28	..	28
Municipal Engineering section	1	..	1
Science and Technology	1	..	1
	81	..	81

Sophomore Class—

	Men	Women	Total
Civil Engineering section	43	..	43
Mechanical Engineering section	19	..	19
Electrical Engineering section	51	..	51
Municipal Engineering section	1	..	1
Science and Technology	4	..	4
	118	..	118

Freshman Class—

	Men	Women	Total
Civil Engineering section	55	..	55
Mechanical Engineering section	34	..	34
Electrical Engineering section	66	..	66
	155	..	155

	Men	Women	Total	
Unclassed Students	41	..	41	
				467

THE DEPARTMENT OF AGRICULTURE.

The College of Agriculture—

	Men	Women	Total
Senior Class	23	4	27
Junior Class	9	3	12
Sophomore Class	35	10	45
Freshman Class	77	27	104
	144	44	188

The School of Agriculture—

	Men	Women	Total
Intermediate Year	5	2	7
Class A	74	34	108
Class B	123	48	171
Class C	260	108	368
	462	192	654

Additional Courses—

	Men	Women	Total	
Teachers' Summer School	31	59	90	
Summer Forestry School	14	4	18	
Farmers' Short Course	165	4	169	
Dairy School	107	..	107	
Crookston School of Agriculture	79	22	101	
	396	89	485	1327

THE COLLEGE OF LAW.

	Men	Women	Total	
Graduate Students for Doctor of Civil Law	5	..	5	
Graduate Students for Master of Laws	28	1	29	
Senior Class	55	..	55	
Middle Class	89	.	89	
Junior Class	201	2	203	
Third Year (night class)	34	..	34	
Second Year (night class)	34	..	34	
First Year (night class)	64	3	67	
Special Students	98	..	98	
	608	6	614	614

THE COLLEGE OF MEDICINE AND SURGERY.

	Men	Women	Total
Graduate Students	3	..	3
Senior Class	53	2	55
Junior Class	38	2	40
Sophomore Class	28	2	30
Freshman Class	48	1	49
Special Students	2	1	3
	172	8	180

Hamline Medical Department—

	Men	Women	Total	
Senior Class	19	2	21	
Junior Class	16	1	17	
Sophomore Class	35	..	35	
	70	3	73	253

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

	Men	Women	Total	
Senior Class	1	..	1	
Junior Class	2	..	2	
	3	..	3	3

THE COLLEGE OF DENTISTRY.

Senior Class	47	1	48	
Junior Class	49	..	49	
Freshman Class	77	..	77	
Special Students	19	..	19	
	192	1	193	193

THE COLLEGE OF PHARMACY.

	Men	Women	Total	
Senior Class	42	8	50	
Junior Class	45	6	51	
	87	14	101	101

THE SCHOOL OF MINES.

	Men	Women	Total	
Senior Class	12	..	12	
Junior Class	28	..	28	
Sophomore Class	49	..	49	
Freshman Class	61	..	61	
	150	..	150	150

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY.

	Men	Women	Total	
Senior Class	7	3	10	
Junior Class	16	1	17	
Sophomore Class	7	..	7	
Freshman Class	26	1	27	
Unclassed Students	18	1	19	
	74	6	80	80

THE COLLEGE OF EDUCATION.

	Men	Women	Total	
Senior Class	4	11	15	
Junior Class	2	11	13	
Unclassed Students	4	9	13	
	10	31	41	41

THE GRADUATE SCHOOL.

	Men	Women	Total	
Graduate Students	78	49	127	127

THE UNIVERSITY SUMMER SCHOOL.

	Men	Women	Total	
College Section (Less Duplicates)	119	172	291	291
				5141

SUMMARY OF TOTALS.

	Men	Women	Total	
The College of Science, Literature and the Arts	492	902	1394	
Six-year Medical Course (first two years)	90	10	100	
The College of Engineering and the Mechanic Arts	467	..	467	
The Department of Agriculture	1024	303	1327	
The College of Law	608	6	614	
The College of Medicine & Surgery (including Hamline)	242	11	253	
The College of Homeopathic Medicine and Surgery	8	..	8	
The College of Dentistry	192	1	193	
The College of Pharmacy	87	14	101	
The School of Mines	150	..	150	
The School of Chemistry	74	6	80	
The College of Education	10	31	41	
The Graduate School	78	49	127	
The Summer School (college section)	119	172	291	
	3636	1505	5141	5141
Less duplicates	73	2	75	75
	3563	1503	5066	5066

	Men	Women	Total	
Students of Collegiate Grade	2673	1244	3917	
Students of Non-collegiate Grade	890	259	1149	
	3563	1503	5066	5066

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